A Chilton Publication

The Iron Age

THE NATIONAL METALWORKING WEEKLY • DECEMBER 30, 1954

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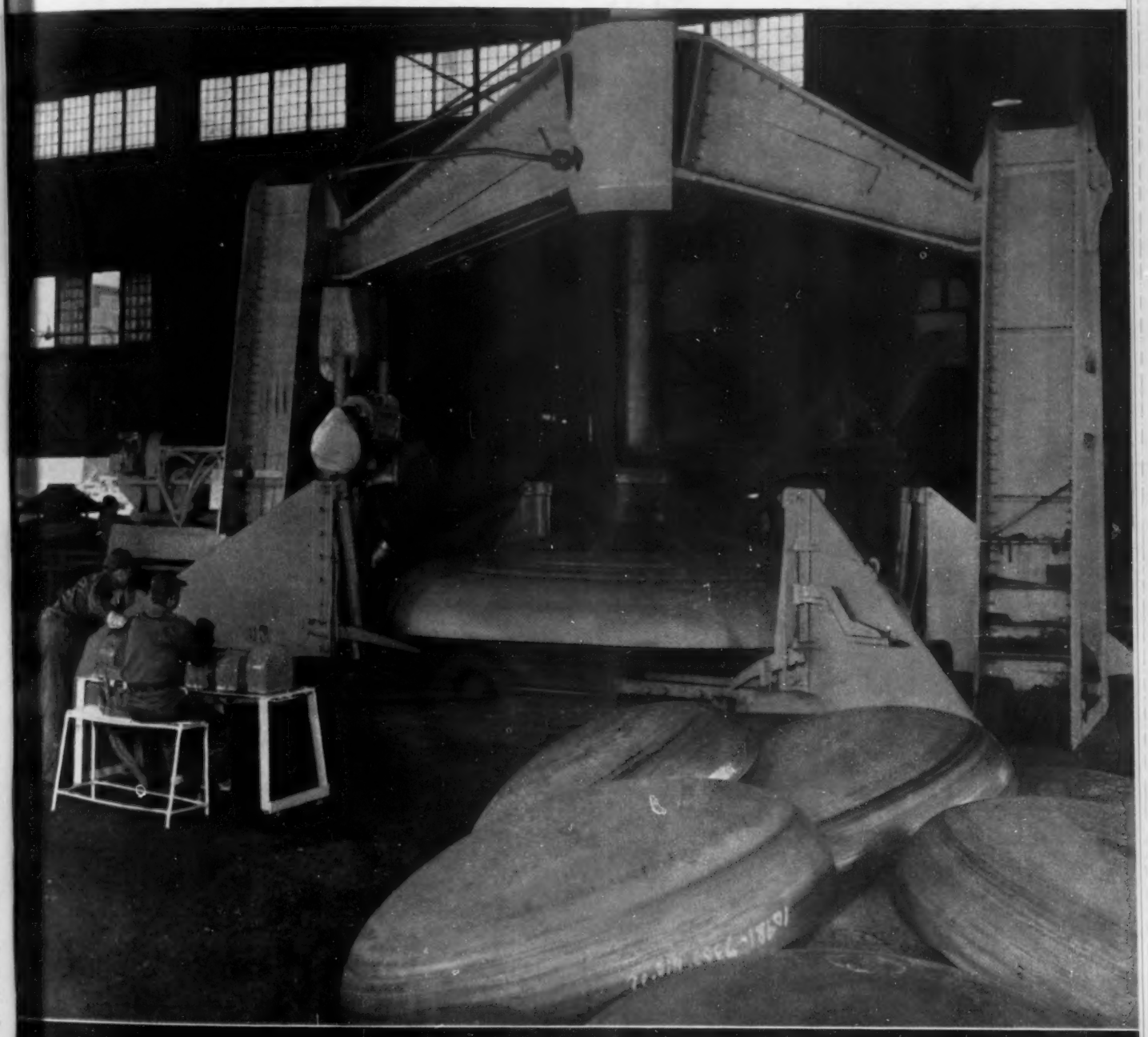
STEEL: Red output soars as U. S. slumps
See page 17



Spinning wheel—modern style. It's a huge machine that spins flanged and dished heads. It's part of Claymont's extensive equipment for forming heads from carbon, alloy and stainless-clad steels or non-ferrous metals. In diameter sizes from 9 inches to 19 feet; in thicknesses from 3/16-inch to 6 inches.

Claymont Steel Products

Products of Wickwire Spencer Steel Division • The Colorado Fuel and Iron Corporation
Wilmington, Delaware

CF&I

How many SPARKS in a Spark Plug?

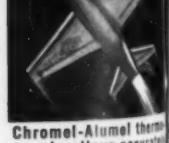
Surprising, the confidence that people have in spark plugs. No one stops to question how many "sparks" they're good for, because long-life performance has come to be taken for granted. Yet, when you get right down to it, you'll find good reasons for this complete consumer confidence. And, from a "sparking" point of view, perhaps the most important is the almost universal use of special Hoskins alloys for the vital electrode wires.

Producing the wire that sparks your car to power is a tough and tricky business. It requires special care in the selection of raw materials. Special melting and production techniques. Plus extremely close control over alloy composition and uniformity of quality throughout the entire manufacturing process.

Yet that's exactly the kind of alloy that Hoskins is qualified to produce best. For, among the other quality-controlled alloys developed and manufactured by Hoskins are: Alloy 717—for facing engine valves; Alloy 785—for brazing belts; Alloy 502—for countless heat resistant mechanical applications. Then, too, there are the Chromel-Alumel thermocouple alloys . . . guaranteed to register true temperature-EMF values within specified close limits. And, of course, Hoskins CHROMEL . . . the *original* nickel-chromium resistance alloy used as heating elements and cold resistors in countless different products.

Hot stuff for hot jobs! Hoskins Alloy 502 is ideally suited to many mechanical-structural applications.

Heating elements made of Hoskins Chromel deliver full-rated power throughout their long and useful life.



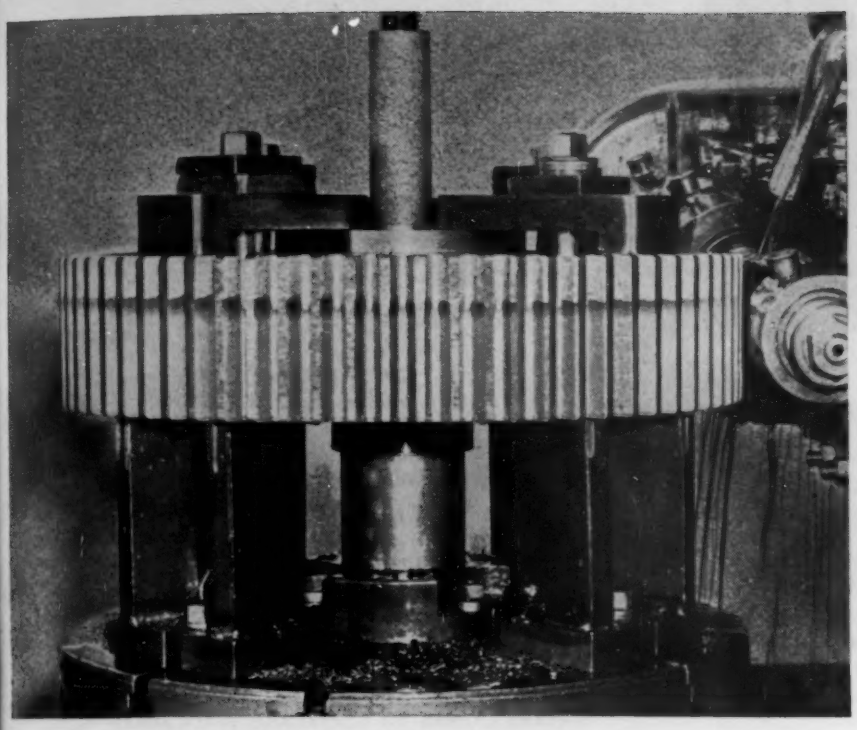
Chromel-Alumel thermo-couple alloys accurately measure exhaust tempera-tures of jet aircraft engines.

Chromel® NICKEL CHROMIUM WIRE

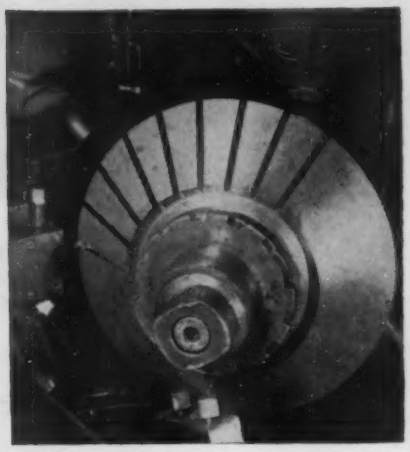
HOSKINS

MANUFACTURING COMPANY

4445 LAWTON AVENUE, DETROIT 8, MICHIGAN



◀ Machining an axle gear at the plant of Goodman Manufacturing Co., Chicago. Widely known for its mining equipment, Goodman is a regular user of Bethlehem gear blanks.



▲ Many firms make strong bevel and miter gears from Bethlehem blanks.

How to make a STRONG Gear and still keep its weight down

Goodman shop craftsman tests a finished gear with master pinion.

Often the first problem in gear design is to achieve high strength with a minimum of weight. Bethlehem supplies an answer to this common problem with its forged-and-rolled gear blanks, which are available in sizes from 10 to 42 in. OD.

Forged-and-rolled means just what it says. The blanks are processed in a unique mill that combines the steps of forging and rolling, with the attendant benefits of both. Each blank has the density and compact internal structure of forged metal, plus the smooth grain flow of a rolled product. The end result is strength—high load-bearing strength. Thus users frequently find it possible to employ thinner, lighter sections than they formerly specified, and still meet every requirement.

Also, because of their good grain flow, uniform density, and clean, homogeneous metal, the blanks are very easy to machine. Cutting speeds are frequently higher, and finish-machining can often be accomplished with fewer cuts.

If you manufacture spur, bevel, miter, herringbone, or other types of gears, Bethlehem's forged-and-rolled blanks can lead to important economies. Please remember, too, that they are excellent for sheave wheels, industrial wheels, turbine rotors, clutch drums, tire molds, and numerous other circular steel products.

Many details—and almost 100 pictures—are to be found in Booklet 216, which is yours for the asking. Write today for a free copy, addressing request to Bethlehem Steel Company, Publications Dept., Room 1037-A.

BETHLEHEM
Forged-and-Rolled
CIRCULAR FORGINGS

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

the iron age

DIGEST OF THE WEEK

Starred items are digested at the right

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Copyright 1954, by Chilton Co. (Inc.)

THE IRON AGE, published every Thursday by CHILTON CO. (INC.), Chestnut & 56th Sts., Philadelphia 39, Pa. Entered as second class matter, Nov. 8, 1932, at the Post Office at Philadelphia under the act of March 3, 1879. $5 for 1 year, $8 for 2 years in United States, its territories and Canada; other Western Hemisphere Countries, $15, other Foreign Countries, $25 per year. Single copies, 50¢. Annual Review Issue, $2.00. Cables: "Ironage," N. Y.

Address mail to 100 E. 42 St., N. Y. 17, N. Y.

NEWS DEVELOPMENTS

REDS NARROW STEEL PRODUCTION GAP — P. 17
Russian steel production gained 7.4 pct in 1954 while United States output slumped 20.8 pct from the record level of 1953. The U. S. now has a 2 to 1 advantage in steel output instead of the 3 to 1 advantage it used to enjoy. Sharp gains in Western European nations helped offset the surging Communist output. Total world steel production declined 5.2 pct to 245,190,000 tons—only countries contributing to the decline were the U. S. and Canada.

MARKET COMES TO CLEVELAND STEEL MILLS — P. 19
Northern Ohio steel producers are finding that the market is coming to them. Ford's stamping plant uses 15,000 tons of cold-rolled sheets a month—and it could hit a much higher figure. The plant's a prime scrap source. And freight's cheap.

REPUBLIC WORKS ON MEXICAN TITANIUM FIND—P. 20
Rugged mountains in the state of Oaxaca, Mexico, are the scenery around Republic Steel's huge new titanium orebody. Transportation is a major problem—but the 25 million tons of rutile already proved make investment of $10 to $15 million worthwhile. Firm plans to concentrate ore near mine, truck it 35 miles to the Pacific for shipment. Will sell to sponge producers. No current plans for reduction plant.

STEEL BIG FACTOR IN BRITISH PROSPERITY — P. 23
Current wave of prosperity sweeping Britain is largely dependent on steel. And steel is being sustained by exceptionally high volume of exports from steel consuming industries. See further expansion of export volume expected in future.

RECESSION OR NOT, '54 WAS SECOND BEST — P. 26
Despite lengthy inventory reduction period and the impact of reduced defense spending, 1954 will go down as the second best business year in U. S. history. Earlier in the year some business experts, politicians and labor leaders tried to panic the nation—wanted a big government spending program. But the Administration was confident pickup was coming. Later events proved it was right.

TWENTY-MINUTE TEST FOR AUTO ENGINES — P. 28
Station built into assembly lines gives new car engines a 20-minute workout. Automatic checks are made of horsepower, speed, operating condition.

IN METALWORKING

ENGINEERING & PRODUCTION

PUT CASTABLE REFRACTORIES TO BEST USE — P. 47
Castables have been found most suitable in smaller furnace structures and in auxiliary parts of larger units. Primary interest in castables is due to their convenience and ease of installation.

EXTERNAL EXCHANGERS OVERCOME CORROSION—P. 50
The use of external exchangers in heating or cooling plating, anodizing and pickling solutions overcomes chemical as well as electrolytic attack. Exchangers consist of an outer steel jacket and an inner tube made of high-heat transfer material.

NOTCH SENSITIVITY OF TITANIUM ALLOYS — P. 52
Notch sensitivity of titanium alloys containing small amounts of vanadium is strongly affected by composition. Microstructures do not affect the notch sensitivity of the alloys, a recent study by Case Institute of Technology shows.

MARKETS & PRICES

EXPECT STEEL GAIN IN FIRST QUARTER — P 75
Steel output in the first quarter of 1955 is expected to exceed any quarter of 1954. Much of the business is already in the bag. And auto producers will put on even greater pressure as they speed production as a hedge against a possible strike. Mills are paying doubletime to keep furnaces going.

SEE CONTINUED AUTOMOTIVE STEEL DEMAND — P 76
There's a growing feeling in Detroit that automakers will continue production at current high levels through the first half of 1955 as a hedge against the possibility of a strike by Reuther's United Automobile Workers.

METAL MARKETS STRONGER AS YEAR ENDS — P 82
Nonferrous markets are generally stronger as 1954 ends than they were a year ago. Aluminum, copper, zinc, lead and even tin follow the pattern—though in varying degrees. And '55 will be better.

NEXT WEEK:

100th Annual Review and Forecast

INDUSTRY SHIFTS BACK INTO HIGH GEAR FOR '55
You can hit the profit bull's-eye in '55—but a rifle will be better than a shotgun. Get at the facts of markets, products, methods, sales and customer likes and dislikes. Also keep close tabs on your inventories to make sure you don't get caught short in a rising market. The Annual Business Roundup tells you what to expect during the coming year.

HOW TO DO BUSINESS WITH THE GOVERNMENT
Military purchasing in 1955 will be stepped up by $2 billion—and Uncle Sam is already industry's biggest customer. This special feature, written by The Iron Age Washington Bureau and government officials, tells you how to cut a slice of the enlarged market. It includes facts about government loans, fast tax writeoffs, special aids to small business, and more.

KEEP UP ON PRODUCTION AND PRICE TRENDS
Many executives keep The Iron Age Annual on their desks all year just to have this statistical portrait of metalworking close at hand. It's an invaluable reference crammed with up-to-the-minute, reliable facts and figures on production and prices.

METALS AND MATERIALS FORECAST FOR 1955
Shipments and production of iron ore, coal and coke, scrap, and refractories during 1954 are reviewed and forecasts of the supply-demand picture are made for 1955. Trends in the fields of stainless and alloy steels are noted along with news and market developments in the nonferrous industry.

ANALYZE TRENDS OF PRODUCTION PROCESSES
Iron Age takes a close analytical look at trends in stamping, forming, forging, casting, welding and metal finishing. New methods are constantly being devised, developed and adopted. Faster, better production at lower cost is the common aim. Automation is growing.

INDUSTRY SPOKESMEN TELL WHAT'S AHEAD
Top men in metal and metalworking industry associations were queried by The Iron Age on 1954 developments and outlook for 1955. Their responses are found in this special section. Frequently cited are expansion and modernization programs now completed which make the American industrial plant the most efficient ever—obviously brightening the profit outlook.

50 lbs. oil pressure

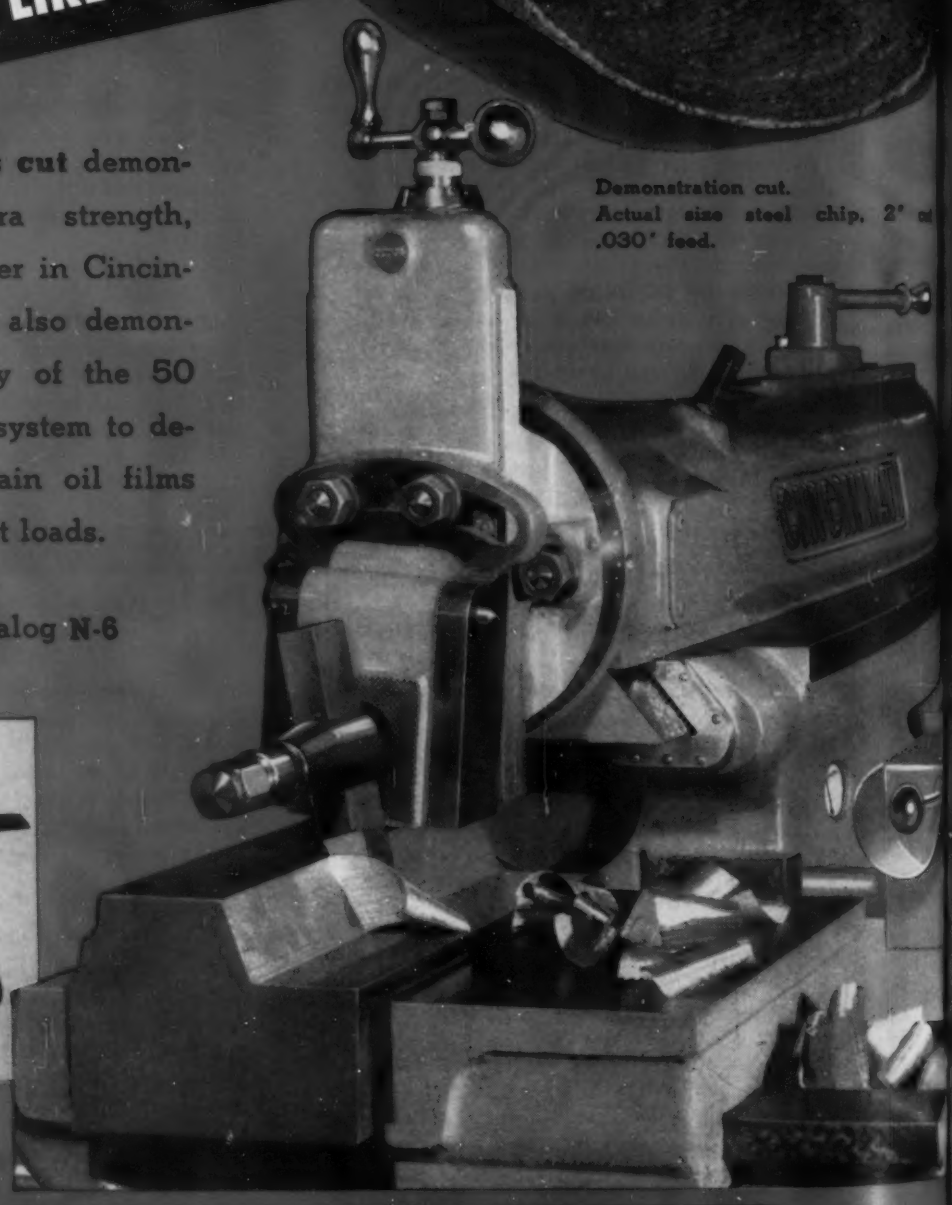
IS NECESSARY WITH A CUT LIKE THIS...

Demonstration cut. Actual size steel chip. 2" at .030" feed.

This tremendous cut demonstrates the extra strength, rigidity, and power in Cincinnati Shapers. It also demonstrates the ability of the 50 p.s.i. lubrication system to develop and maintain oil films under the heaviest loads.

Write for Catalog N-6

50 p.s.i. system includes 50 micro filter, settling basin and reservoir. Transmission runs submerged in oil.



CINCINNATI

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

dear editor:

letters from readers

Versatile Hoppers

Sir:

In Part III of the article on modern centerless grinding by J. E. Hyler which appeared in the Dec. 9 issue, he mentions a versatile automatic hopper that will accommodate many types and sizes of through-feed work, and another hopper designed for in-feed grinding.

We are very much interested in obtaining hoppers of this type and would appreciate it if you could give us the names of the companies making these feeds. *A. H. Kastberg, Purchasing Agent, Henry L. Hanson Co., Worcester.*

Both types of hoppers are made by Cincinnati Grinders, Inc., Cincinnati 9, O.—Ed.

Startmaster

Sir:

Your article in Fatigue Cracks, IRON AGE of Nov. 18, was the straw that broke the camel's back. I refer particularly to your comment in awe-struck wonder that the new Lincoln has a "startmaster" ignition.

The reason for expressing my sentiments in these words is that there appears to be general ignoring, whether deliberate or inadvertent, of those individualistic-minded persons in these United States who are not subject to the Big Three. This 4 pct, for your information, constitutes approximately those people who purchased the products of Studebaker, Nash, Hudson, Packard and Kaiser during 1953.

This critical comment applies likewise to your automotive editor, who, when writing to you from Detroit, might have referred to the fact that, for instance, Nash has had for many years an ignition system which starts by the lifting of the gear lever in neutral; likewise, Nash has had since at least 1938 an outstanding heating system depending upon air taken from outside the car through an outlet far above the level of those noxious gases generated by other automobiles. It may be noted, with respect to this particular point, that General Motors in 1953 suddenly discovered this position for the air intake was advantageous.

In addition, I might quote such points as the reclining seat and bed, four-coil springing, and other features which have been peculiar to Nash for many years.

I have run out of indignation at this point and merely wish to state at this time that the products of the independent automobile maker have many points of superiority, and it distresses me that more publicity is not given them. *R. D. Wilcox, Pittsburgh.*

Our automotive editor had no part in that item. As we recall it, the 1929 Studebaker started when the ignition was turned on—so did the 1919 Franklin.—Ed.

Industrialization

Sir:

We have read with interest your article about Scranton in the Nov. 25 issue, p. 53. We would like to have permission to reproduce this article for use in our industrial program. Of course, IRON AGE would have a credit line on the bottom of the reproduction. *Major Lee White, Jr., Industrial Commissioner, Scranton Chamber of Commerce, Scranton, Pa.*

Continuous Casting

Sir:

REGARDING DEC. 9 ISSUE, P. 149, YOU REFER TO CONTINUOUS CASTING AS TAKING PLACE AT MIDLAND PLANT. ALL OF OUR CONTINUOUS CASTING IS BEING DONE AT OUR MADISON DIVISION. *Paul Filter, The Dow Chemical Co., Midland, Mich.*

Would your profits disappear with a big drop in prices?

Scrap steel prices can move fast in either direction...mean big profits —or damaging losses—to dealers and foundries alike.

That's why we think more dealers should lend their support to the newly formed futures market in scrap—do all that they can to insure a normal operating profit for everybody, whether prices go up *or* down.

If you've been trusting your profits to luck . . .

If you think you should know more facts about the futures market yourself—then maybe we can help.

We'll be happy to mail you our 64-page guide on futures market fundamentals . . . be glad to include our special 4-page report on just how scrap steel dealers and foundries can apply them to their advantage.

There is no charge, of course. Just write for *"How to Hedge Commodities"*, and address your card or letter to —

HOWARD BIEL
Scrap Steel Department

MERRILL LYNCH, PIERCE, FENNER & BEANE

141 W. Jackson Blvd., Chicago 4
Telephone: WAbash 2-8950

"Invest—for the better things in life"

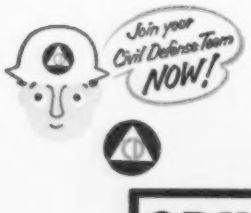
measuring up

...and REX is the standard by which all high speed steels are compared

An older brother sometimes makes a handy yardstick for measuring junior's growth. And when it comes to tool steels, REX® High Speed Steel is — and has been for over 50 years — the standard of comparison.

There's no mystery to REX High Speed Steel. Its quality has been time-tested in thousands of shops. And after all, it's performance — not claims — that really counts. Make your *own* comparison test. Put REX High Speed Steel to work. Compare its structure, finish, hardenability, carbide distribution and general uniformity. You won't find another high speed steel that surpasses REX.

Remember, too, that even though it is widely distributed and used, REX High Speed Steel is made *only* by Crucible. So for tops in high speed steel performance, be sure you order the Crucible REX brand.



CRUCIBLE first name in special purpose steels

54 years of Fine steelmaking **TOOL STEELS**

CRUCIBLE STEEL COMPANY OF AMERICA · TOOL STEEL SALES · SYRACUSE, N. Y.

fatigue cracks

by William M. Coffey

One Dozen Roses

It doesn't pay to make reckless statements, no matter how obvious the truth or the facts of the matter may appear in a tired moment.

Returning home with The Missus on the old commuter's special from a hard shopping fight in the big city — she pointed out the Greenwich Boys Club through the window and wanted to know if we'd ever seen it.

Seen it? We'd seen it every day of our life, twice a day, for 5 years. Seen it, indeed. Matter of fact we bet we'd seen it 3000 times and allowed we were just a little tired of it. Even went further, said we'd been around the world 5 times on this iron horse. Then tried to go back to sleep.

Several days later we happened to mention this little incident to a few friends, with appropriate remarks about how women think. Being odd type friends, they immediately went to work to prove how utterly stupid we were to make such a claim. First, they said, you didn't travel that train on 104 Saturdays and Sundays, 10 vacation days, 7 holidays, 44 goof-off days and 50 out-of-town days. The most number of days you could possibly have seen the Greenwich Boys Club was only 150 days—and then you wouldn't have seen it IF—

a. there was a fog
b. the window was dirty
c. a blonde was sitting across the aisle
d. . . . and from late Fall to early Spring when it's dark.

One of the eager ones puts in a call to the Weather Bureau who says a good fog rolls into Greenwich an average of 15 days a year, all of course on weekdays, non-holidays and non-goof days; another call to the Supt. of Maintenance of the railroad (after swearing secrecy to the grave) informed us we can count on the windows being dirty 30 days a year; the Farmer's Almanac says it is dark an average of 75 days and we all agreed a blonde, or equivalent, was on hand half the time. So we couldn't possibly have seen the Greenwich Boys Club more than 15 days in one year! Then they knifed it deeper and twisted. At the fast rate the train travels you see it for only one second. In a whole year you see it for only 30 seconds, in five years only 2½ minutes and for a lousy 2½ minutes you get mad at your wife.

Cost us one dozen roses and fourteen martinis, extra dry.

Puzzlers

The answer to Benny (the fox hunter) Cyboron's greyhound-chase-fox puzzler (Dec. 9) is 108 leaps for the fox and 72 for the greyhound. Of course, as Prof. B. B. Rector says no fox worth his tail would run in a straight line, but there it is, this one did. Winners: C. W. McKinley, Norman A. Osborne, Jim Mull and Marilyn (who is all mixed up as far as the proper relationship between man and wife is concerned), R. M. Burns, Arian Walker and Dale Letterman. Charlsie Vunovic, recently married, tried but missed this one.

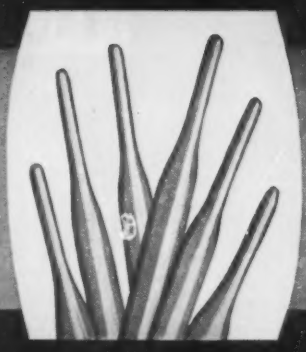
New Puzzlers

Here's one submitted by Mr. G. J. Campbell, who says he's slowly going nutty trying to work it out. Can you help?

Water	Gas	Electricity
House #1	House #2	House #3

Problem: Connect each house with each utility, however do not cross any lines, no connections can be made from house to house or from utility to utility—and no connections running overhead or underground.

take another look at your.



WELDING ELECTRODE COATING

. . . here is a scientific blend of upwards of ten different chemicals and minerals that transform a piece of wire into a valuable production tool. But the rod is no better than the quality of the materials that comprise its coating.

Foote's exacting production control assures the vitally important chemical and physical uniformity of all its coating materials. That is why Foote is recognized as the leading supplier of raw materials that go into the manufacture of quality welding electrodes.

Detailed information is given in the booklet "Foote Raw Materials for Welding Rod Coatings." Write for your copy.

Foote
MINERAL COMPANY

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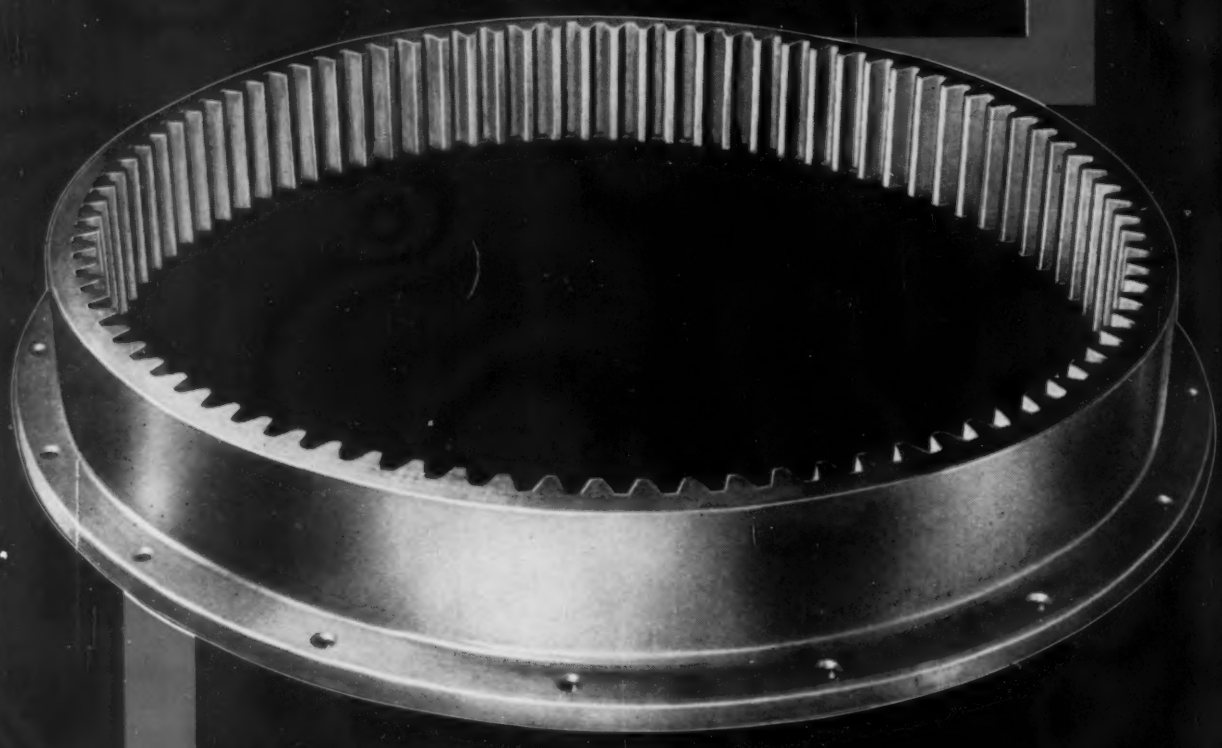
RESEARCH LABORATORIES: Berwyn, Pa.
PLANTS: Exton, Pa.; Kings Mountain, N.C.; Sunbright, Va.

for INTERNAL GEARS...



PHILLIE GEAR®

Philadelphia Internal Gears are widely used in many types of Speed Reducers, Clutches, Transmissions and Power Take-offs utilizing either single pinion or planetary drives.

Internal Gearing is often favored, because of its great strength, increased tooth contact, shorter center distances and more quiet operation than conventional spur gears.

"Phillie Gear" can produce Internal Spur Gears in diameters up to 160 inches, 24 inch face . . . any pitch or material. Also available are Internal Helical Gears in diameters up to 60 inches.

For courteous service and fast action . . . consult "Phillie Gear".

PHILADELPHIA GEAR WORKS, INC.

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Industrial Gears & Speed Reducers

LimiTorque Valve Controls

dates to remember

JANUARY

INSTITUTE OF SCRAP IRON & STEEL —Annual convention, Jan. 5-8, Miami Beach, Fla. Institute headquarters are at 1729 H St., N. W., Washington.

SOCIETY OF AUTOMOTIVE ENGINEERS—Golden Anniversary annual meeting and Engineering display, Jan. 10-14, Sheraton - Cadillac Hotel and Hotel Statler, Detroit. Society headquarters are at 29 W. 39th St., New York.

AMERICAN SUPPLY & MACHINERY MANUFACTURERS ASSN., INC. — Regional meeting, Jan. 12-15, Biloxi, Miss. Association headquarters are at 2130 Keith Bldg., Cleveland.

EXPOSITIONS

NATIONAL ASSN. OF CORROSION ENGINEERS—Annual meeting and Show, Mar. 7-11, Palmer House, Chicago. Association headquarters are at 1061 M & M Bldg., Houston.

AMERICAN SOCIETY FOR METALS—Western Metal Exposition and Congress, Mar. 28-Apr. 1, Pan Pacific Auditorium, Los Angeles. Society headquarters are at 7201 Euclid Ave., Cleveland.

STEEL SHIPPING CONTAINER INSTITUTE, INC.—Winter meeting, Jan. 19-20, Hampshire House, New York. Institute headquarters are at 600 Fifth Ave., New York.

SOCIETY OF PLASTICS ENGINEERS, INC.—Annual national technical conference, Jan. 19-21, Chalfont - Haddon Hall Hotel, Atlantic City, N. J. Society headquarters are at 513 Security Bank Bldg., Athens, Ohio.

CUTTING TOOL MANUFACTURERS ASSN.—Annual meeting, Jan. 20, Detroit Yacht Club, Detroit. Association headquarters are at 416 Penobscot Bldg., Detroit.

STEEL PLATE FABRICATORS ASSN.—Annual meeting, Jan. 20-21, Palmer House, Chicago. Association headquarters are at 79 West Monroe St., Chicago.

MALLEABLE FOUNDERS' SOCIETY—Semi-annual meeting, Jan. 21, Cleveland Hotel, Cleveland. Society headquarters are at Union Commerce Bldg., Cleveland.

INDUSTRIAL HEATING EQUIPMENT ASSN., INC.—Annual meeting, Jan. 24-25, Sheraton - Cadillac Hotel, Detroit. Association headquarters are at 412 Fifth St., N. W., Washington.

PLANT MAINTENANCE & ENGINEERING SHOW—Jan. 24-27, International Amphitheatre, Chicago. Show Management: Clapp & Poliak, Inc., New York.

TRUCK TRAILER MANUFACTURERS ASSN., INC.—Annual convention, Jan. 27-29, Boca Raton, Fla. Association headquarters are at Room 710 Albee Bldg., Washington.

FEBRUARY

AMERICAN INSTITUTE OF MINING & METALLURGICAL ENGINEERS—Annual meeting, Feb. 14-17, Conrad Hilton Hotel, Chicago. Institute headquarters are at 29 W. 39th St., New York.

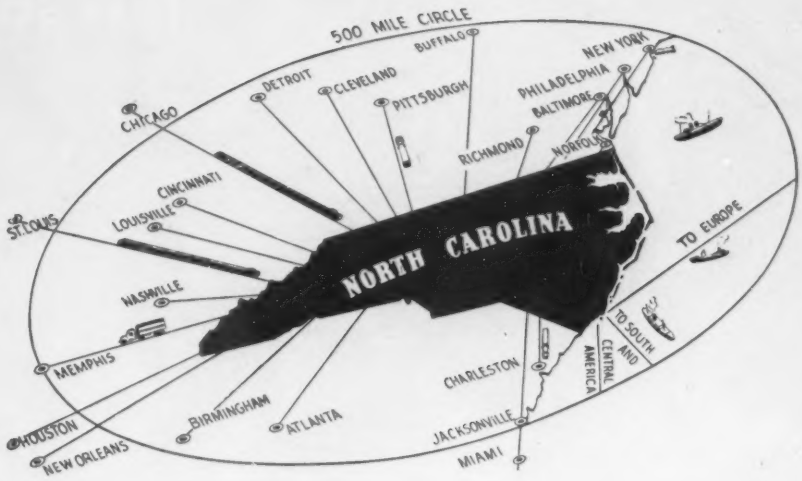
AMERICAN SOCIETY OF MECHANICAL ENGINEERS — Founding Anniversary meeting, Feb. 16, New York. Society headquarters are at 29 W. 39th St., New York.

DROP FORGING ASSN.—Winter Industry meeting, Feb. 17-18, Statler Hotel, New York. Association headquarters are at 605 Hanna Bldg., Cleveland.

MARCH

PORCELAIN ENAMEL INSTITUTE — Pacific Coast conference, Mar. 10-11, Biltmore Hotel, Los Angeles. Institute headquarters are at Dupont Circle Bldg., 1346 Connecticut Ave., N. W. Washington, D. C.

GREATER PRODUCTIVITY plus NEARNESS TO MAJOR MARKETS



—two of the many long-range advantages to industries in *North Carolina*

Proven productivity by North Carolina labor—responding to an honest day's pay with an honest day's work that means *reduced unit costs*—is a big factor in the successful operation of varied industries in the South's leading industrial State.

Market-wise, North Carolina's position within 500 miles of more than half the total population of the United States—and in the midst of the great and growing Southern market—is another vital advantage.

These and other important factors—power, water, transportation facilities, year 'round temperate climate—explain North Carolina's continuing industrial growth.

For a copy of the latest list of sites and buildings—urban and rural, in mountain, piedmont and coastal areas—write, wire or call Ben E. Douglas, Director, Department of Conservation and Development, Raleigh 11, North Carolina.

The 48-page booklet "NORTH CAROLINA STORY" describes the State's industrial diversity in a chapter "From Aircraft to Zippers". Write for a copy.

Friendly North Carolina Where Industry Prospers

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The Iron Age Newsfront

Summer Strike Threat Speeds Auto Output

One reason behind record breaking auto production rates is the strong possibility of a strike in early summer at one or more of the Big Three. UAW's determination to gain some kind of wage guarantee will be bolstered by a $25 million strike fund.

Press Production Rates Keep Going Up

With improvement in latest designs for automatic handling, press rates for major stampings are going up. Forming operations on large blanks are being carried out at rates as high as 18 strokes per minute. Secondary forming operations are heading for 25 strokes per minute in a few shops.

Wider Use of Mexican Ores Seen

Scramble for Western ore deposits may bring utilization of Mexican ores. At start of World War II their use was studied but Mexicans required heavy local employment, and the memory of early expropriation still lingered. One deposit contains 67 pct ore but would require $20 million to set up a plant and transportation.

Improved Cutting Materials Ready

A machinable high density tungsten-nickel-copper carbide alloy will soon be introduced. Also coming is a new type cutting material made from chromium carbide. The chromium carbide will have high corrosion and abrasion resistance with thermal coefficients similar to that of steel.

New Steel Warehouse Chain Rumored

Some steel warehouses see first quarter 1955 as the best prospective selling period in the last five quarters. Others, noting the fall in year end sales are not so sure of the future. Several consolidations have been strongly rumored, including hints of a new national chain. Fabricators are still hotly competitive with a good portion of jobs going for cost or less to keep crews busy.

Aluminum: Continuous Cast At 10 Fpm

Continuous casting speeds of up to 10 fpm on 1 in. aluminum rod have been reported by one firm engaged in experimental work. Refinements are expected to push this output rate higher.

Coal: Future Markets Strong

Despite anticipated growth of atomic energy in production of electric power, industry will continue to rely chiefly on coal. Possible quadrupling of generating capacity by 1975 will demand tremendous fuel supplies. Natural gas producers are also eyeing coal as a possible future source for gas.

More Dream Cars Are on the Way

Get ready for a new series of dream cars shortly after the first of the year. GM's Motorama, which will open again in New York early in 1955, will set the pace with a completely new series from each division.

Have Your Computing Done By Mail

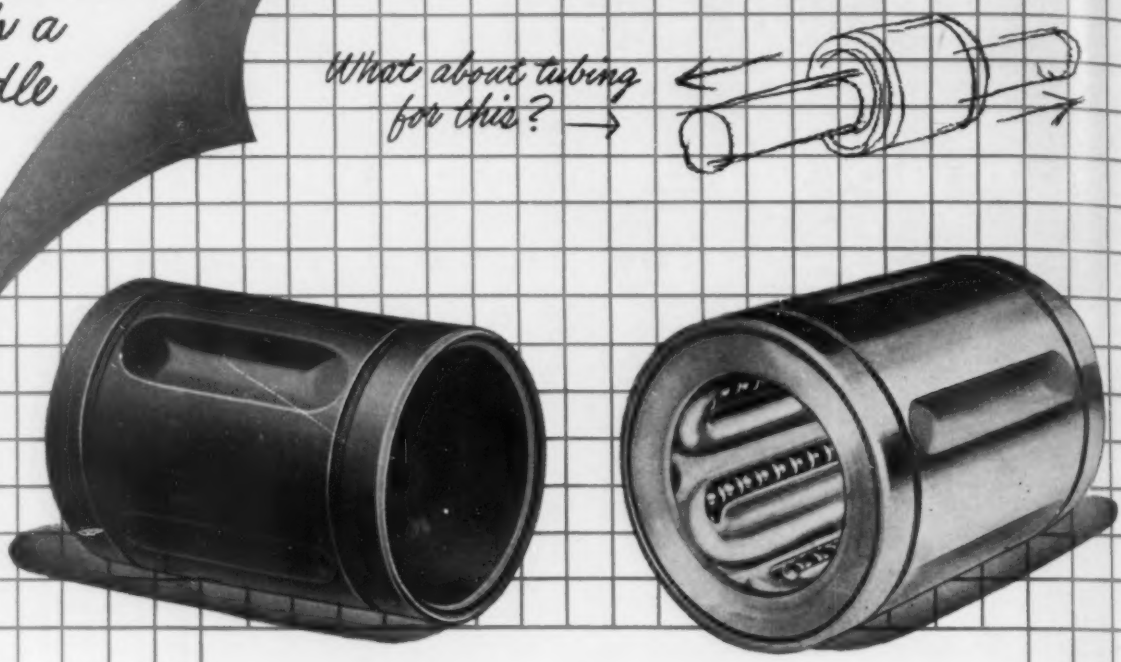
Mail order computing and job shop computing are opening new doors for research and engineering staffs not able to invest in computers of their own. Using a card-programmed-calculator, a general purpose electronic digital computer, one computer center takes data received by mail, processes these through the machine, and mails back the answers.

British Hope to Double Living Standard by '79

Some British economists believe the British can double their standard of living by 1979. They see a rise in per capita output of 15 pct every 6 years. Future changes in size of the working population are expected to be small. Estimates are based on the 1954 employment level.

This started with a doodle

What about tubing for this? →



Precision Tubing for Precision Jobs

Tubing tolerance is a big "must" on this job. Thomson Industries, Manhasset, N.Y., insists on it. Otherwise, manufacturing BALL BUSHINGS (ball bearings for linear motion) would have been even tougher than it was.

Part of the problem was the tubing to house the bearings and the raceway. Those bearings are very tough on tubing . . . especially at the contact points.

Other requirements were: good surface conditions; good dimensional control, both I.D. and O.D., uniform wall thickness; uniform concentricity; and uniformity from a metallurgical standpoint to stand heat treating.

And, equally important, economy. By using ELECTRUNITE Tubing, Thomson Industries eliminates a grinding operation. That helps keep costs down.

The tubing that has all these advantages is Republic ELECTRUNITE, a *precision* mechanical tubing for applications like this. You can get it in carbon or stainless analyses. And Republic engineers will be glad to help you use it, profitably, in whatever products you make. Call your nearest Republic Sales Office or write to:

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Steel and Tubes Division
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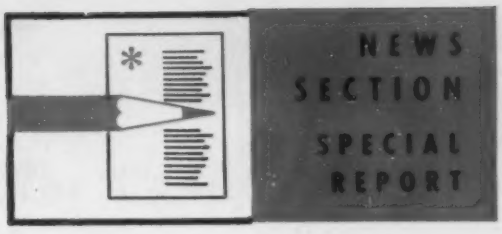
Export Department: Chrysler Building, New York 17, New York

REPUBLIC ELECTRUNITE TUBING

REPUBLIC STEEL

About This Article On World Steel

This article is based on a world steel production study just completed by The Iron Age. Assisting in the study were the Intelligence Dept. of the British Iron & Steel Federation, Chambre Syndicate de la Siderugie Francaise, United Nations, Industry Div. of Economic Commission for Europe, American Iron and Steel Institute, and Iron Age correspondents around the world.



REDS: Narrow Steel Ingot Gap

Communist bloc boosted steel output 7.7 pct while Free World dipped 9.0 pct in '54 . . . Cuts advantage 25 pct . . . Biggest drop was in U. S.—By W. V. *Packard*.

◆ IRON CURTAIN countries again registered impressive gains in steel production during 1954—while production in the Free World declined. As a result, the Free World's 4-to-1 advantage in steel production has been slashed to 3 to 1.

Total world steel production in 1954 declined 5.2 pct from the 1953 record, largely because of a 20.8-pct decline in U. S. output. World output in 1954 was 245,190,000 net tons, compared with 258,706,000 tons in 1953.

Spearheaded by Russia, countries in the Soviet bloc produced 7.7 pct more steel in 1954 than they did in 1953. Production in countries of the Free World fell 9.0 pct short of the record established in 1953.

Combined production of Russia and her satellites was 62,825,000 net tons in 1954, compared with 58,337,000 tons in 1953. Output in Free World countries was 182,365,000 tons in 1954, compared with 200,369,000 tons in the previous year.

Although U. S. production declined 20.8 pct in 1954 while Russian output gained 7.4 pct, the U. S. still produced about twice as much steel as the Russians. (Prior to 1952 the U. S. advantage was better than 3 to 1.) U. S. output in 1954 amounted to 88.3 million tons, compared with 111.6 million tons the previous year. Russia produced 44.9 million tons in '54; 41.8 million tons in '53.

All but two of the 27 countries listed in THE IRON AGE study of world steel production showed gains in 1954 over the previous year. In addition to the U. S., Canada also showed a decline.

West Europe Up

Russia dominated steel production behind the Iron Curtain far more than the U. S. did Free World output. The Russians poured 71.5 pct of steel made in the Communist bloc, while the U. S. produced only 48.4 pct of Free World steel.

The Free World would have compared much less favorably with the Iron Curtain countries in 1954

World Steel Production Falls 5.2 Pct In 1954

(Ingots and Castings—000 net tons)

	1954*	1953†	Pct Change
Australia	2,460	2,296	7.1
Austria	1,755	1,427	22.9
Belgium	5,385	4,997	7.8
Brazil	1,240	1,109	11.8
Canada	3,120	4,110	—24.1
China	1,200	1,150	4.3
Czechoslovakia	5,100	4,881	4.5
France	11,335	11,023	2.8
Germany—West	19,100	16,997	12.4
East	3,775	3,655	3.2
Hungary	1,755	1,651	6.2
India	1,860	1,691	10.0
Italy	4,475	3,858	16.0
Japan	8,715	8,445	3.2
Luxembourg	3,070	2,931	4.7
Mexico	540	504	7.1
Netherlands	1,010	948	6.5
Poland	4,495	3,965	13.1
Rumania	905	792	14.1
Saar	3,075	2,959	3.9
South Africa	1,480	1,366	8.3
Spain	1,215	985	23.4
Sweden	2,085	1,969	5.9
United Kingdom	20,725	19,723	5.1
U. S. S. R.	44,900	41,800	7.4
United States	88,335	111,610	—20.8
Yugoslavia	690	568	21.5
Others	2,450	2,280	7.5
Totals	245,190	258,706	— 5.2

*Estimated †Revised

steel production had it not been for the strong recovery of western European countries.

For example steel production in Spain increased 23.4 pct, Yugoslavia 21.5 pct, Italy 16.0 pct, and Western Germany 12.4 pct.

Countries listed in the Iron Curtain totals are shown in red in the accompanying table. Note that Austria is included in Iron Curtain totals, even though part of the country is occupied by Western powers. This is offset by placing the entire miscellaneous tonnage in Free World totals. Although Yugoslavia is a Communist country, it is listed with the Free World because it is not within the Russian sphere of influence.

Expansion:

Commerce Dept. charts postwar industrial growth.

Manufacturing corporations used $115 billion of capital funds in adding production facilities, inventories and working capital since the end of World War II, new government statistics show.

The figures, which provide a graphic illustration of the rapid growth of manufacturing since 1946, reveal that two-thirds of the capital expenditures in the 8½-year period were for plant and equipment; about one-fourth went for higher inventories, and extension of customer credit absorbed the remainder. The survey was conducted by Commerce Dept.'s Office of Business Economics.

More Machines Per Worker

The physical stock of privately-owned business equipment in 1953 was about twice that of the late Twenties—most of the build-up coming after 1946. Equipment per worker, as well as output per worker, is now about 1½ times as much as the late Twenties. Output per dollar value of equipment, while fluctuating, is neither up nor down in the long run.

Value of manufacturing machinery in terms of "constant dollars" —value adjusted to compensate for inflation—increased 11 pct from 1928 to 1941, and 120 pct from 1941 to 1953. Total value of transportation equipment rose 7 pct from 1928 to 1941, and 65 pct from 1941 to 1953.

Manufacturers relied principally on internally-generated funds in meeting postwar fiscal requirements. Undistributed profits and depreciation allowances totaled $78 billion, of which $48 billion was retained earnings.

Cash Assets Drop

Long-term debt amounted to only $15 billion of the increase, reflecting a trend by manufacturers to use sparingly of that device to secure expansion capital. Less than $4 billion of the increase came from new stock issues.

Cash assets were decreased sharply in the first half of 1954, largely because of the increased federal tax drain. A reduction in tax accruals to meet future tax payments, because of lower before-tax profits, and reduced excise taxes also contributed to the cash decline.

Okay Follansbee Sale

The Follansbee Steel Corp. deal has been completed. The company has approved sale of its assets to Frederick W. Richmond, of New York.

Under the arrangement, Mr. Richmond paid $9.3 million for the assets. In turn he will resell the properties in Follansbee, W. Va., to the F-S Corp., headed by Cyrus Eaton of Cleveland. Mr. Eaton plans to operate the plant for at least three years with the present employee force.

Corporate Shell of Follansbee will be merged with Frontier Chemical Co., and Consumer Co., with headquarters in Dallas. Stock certificates in the new company, which becomes the Union Chemical & Materials Corp., will be received by Follansbee shareholders as well as a stock dividend of one share of $5 par 5 pct preferred stock in the new company.

"He's so dumb he doesn't even know how to lack ambition."

Steel:

McLouth starts first U. S. oxygen bessemer units.

McLouth Steel Corp. placed its oxygen process steelmaking units in operation last week. Installation is the first U. S. adaptation of the revolutionary process developed in Austria.

Near End of Program

The $7 million installation nearly rounds out McLouth's $100 million integration program. Other units already installed are the blast furnace and ore docks, the world's largest electric furnace, and a hot sheet mill. Cold-rolling and other finishing operations have yet to be completed.

The oxygen process installation includes three 40-ton converters with a capacity of 1500 tons of steel a day. The plant supplying high purity oxygen is the largest in use in the steel industry.

Use Smoke Control Unit

Molten iron from the blast furnace is poured into the vessels and oxygen is introduced at supersonic speed from a lance lowered to the surface of the molten metal.

Decision to use the oxygen process at McLouth was prompted by unique conditions at the Trenton, Mich., plant. Village ordinances prevented installation of bessemer converters. In addition, the new electric furnaces and the oxygen converters will be tied in with a $1 million smoke control unit.

CLEVELAND: Market Comes to Mills

Ford stamping plant uses 15,000 tons of c-r sheet monthly . . . Could hit 2-3 times after completion . . . Much bought from local mills . . . And plant is prime scrap source . . . Freight cost low—*By T. M. Rohan.*

◆ SANTA CLAUS came early to Cleveland steel mills in '54.

Although a host of midwest steel mills are fighting for a toehold in the lush Detroit market, Northern Ohio producers are finding their auto market coming to them.

Although not quite a mountain-to-Mahomet operation, the new Ford stamping plant in Cleveland's suburban Walton Hills is already consuming about 15,000 tons of cold-rolled sheets monthly according to local steel firms estimates. Since the plant is only partially completed it could eventually hit two or three times this figure. A considerable amount of this tonnage is already coming from local Cleveland sheet mills with remainder from Buffalo area and Ford's own Rouge Works.

New Bundle Source

This tonnage is in addition to regular heavy shipments to Detroit and locally in Cleveland to Chevrolet and Fisher Body stamping plants located here for years, auto suppliers, stove, refrigerator and vault manufacturers which have pushed mill rolling schedules almost solid through the first quarter.

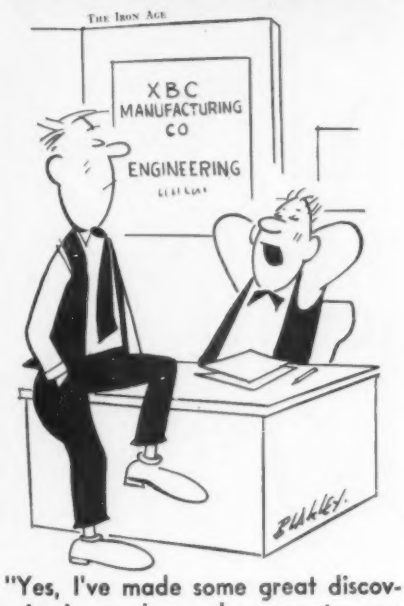
A second major windfall in the stamping operation here is a new source of scrap bundles for local mills—almost 25,000 tons monthly when production hits full stride according to Cleveland scrap dealers and brokers. Ford plant now is producing about 6000 tons monthly, running neck and neck with the Chevrolet and Fisher plants in bundle generation.

Expand While Building

Imposed on existing substantial local markets the potential half-million-ton annual additional steel consumption could make Northern Ohio a greater steel-minus area in C-R sheets at least. And big sheet producers like Republic at Cleveland and Warren, Jones & Laughlin at Cleveland, and Youngstown Sheet & Tube are eager for the business.

Most have recently completed major expansions and will welcome this expansion in their back yard market where freight equalization is not required. If the trend mushrooms with other automakers, additional expansion of cold-rolled sheet capacity is possible.

The Cleveland stamping plant—expected to start full scale operations in early 1955—was located in Cleveland primarily for freight advantages, labor supply and closeness to steel producers, according to Henry Ford II who visited it in October (THE IRON AGE, Oct. 21, 1954). Plant was originally scheduled for 16 press lines but expansion has started while the original plant is still being built. It is currently turning out Ford hoods and some body subassemblies.



"Yes, I've made some great discoveries in my day and some cute ones at night too."

Steel industry sources indicated last week one of the major suppliers so far has been Bethlehem's Lackawanna mill outside Buffalo. This mill has been a major source for Ford's body stamping plant at nearby Hamburg, N. Y. The new Walton Hills mill is patterned after this, although on a larger scale, so uses similar sizes and forms.

Get Freight Break

The Cleveland mills will be able to deliver to Walton Hills with only a $1.50 local freight charge compared to a rate from Buffalo of about $5 per ton. Youngstown can deliver in Cleveland for about $3 per ton freight or well under Buffalo.

Bethlehem's use of its own Lake carriers in summer, however, can narrow the margin considerably. On shipments into Detroit, freight absorption ranges from $2.60 from Cleveland to $4.40 from Chicago. This includes a $1 increase last week due to price change by Detroit area producer.

One of the imponderables for local Ohio producers is how much cold-rolled sheet tonnage Ford will ship from its own Dearborn mill. Steel salesmen's rule of thumb is that Ford generally supplies about 50 pct of its sheets from its own mills. Although last week several Ohio steelmen doubted this would be economical for the Cleveland plant, Ford undoubtedly will continue to lean heavily on Rouge Works at Dearborn.

This mill has total cold-rolled sheet capacity of 707,400 annual tons including a four-high, single-stand 84-in. reversing cold reduction mill and a 66-in. continuous mill.

TITANIUM: Develop Mexican Jackpot

Republic has rich rutile lode in Oaxaca . . . Rugged terrain makes transportation tough . . . Plan to sell 95-pct concentrate to sponge producers . . . Don't plan sponge production—yet—*By T. M. Rohan.*

WHILE a good part of the metalworking field awaits a cheaper method of extracting titanium, Republic Steel has taken off on a different tangent. In the words of Republic president Charles M. White:

"If you start with a richer ore, you can't help but lower the cost of reduction, no matter which system you use."

Republic found its answer deep in the rugged mountain country of the state of Oaxaca, Mexico. Its deposit is 35 miles inland from the Pacific, 4000 ft in the air up a 60° mountainside and 436 miles southeast of Mexico City.

Over 25 Million Tons

Republic plans a mine and concentrating plant near Pluma Hidalgo close to what is believed to be the largest rutile deposit in the western hemisphere. Ore runs about 20 to 25 pct rutile, which consists of approximately 60 pct titanium and 40 pct oxygen as compared to the 26 to 28-pct titanium content of ilmenite from Florida, Australia and Indian beach sands now being used.

Proved reserves are in excess of 25 million metric tons although only two of 38 claims on 8000 acres have been thoroughly investigated. Republic's investment will probably run between $10 million and $15 million. Principal reason is some of the world's most rugged (and beautiful) terrain, poor roads, and absence of power, food, shelter and transportation.

Everything must be moved in by jeep or light truck including mining machinery. First shipments out are expected in about a year and will be sold to regular titanium producers.

According to present plans the ore will be mined, crushed to 40 mesh or rough tablesalt fineness and concentrated to 95 pct. Crushing, grinding and spiral gravity methods have been worked out with the cooperation of the U. S. Bureau of Mines at College Park, Md. Standard concentrating equipment will include a crusher, ball or rod mill and spiral separator with capacity of approximately 250 tons per day.

Concentrated ore will be hauled 35 miles through the mountains to Puerto Angel for shipment. Currently there is a dilapidated 250-ft wood pier there used for loading coffee. The Mexican government is considering putting in a 100-ft dock which could handle 5000-ton capacity ships.

Where Rutile Was Found

Ruggedness of the area is difficult to depict. Most common method is via the unconquerable Jeep over a narrow government road hugging the mountainside. Road building there costs up to $25,000 per mile. In rainy season this is washed out regularly so 2 and 3-day delays are common.

All processing machinery will have to be broken down into Jeep or 7-ton-truck loads, imposing severe design limitations on equipment. Ore transportation is such a severe problem that consideration is being given to a huge aerial tramway to carry the ore downhill. Force of gravity could also be used to drive generators for a mill power source. Diesel electric power will be used at the start however, and abundant waterfalls in the area hold promise of waterpower.

"There is no reduction plant in the picture now," Mr. White said. "We may go into a partnership with another firm or come up with a new reduction method in our own laboratory. We are in this to bring about lower cost titanium to make it more of a factor in company products. We are currently selling titanium aircraft bolts for $75 each. Even at this fantastic figure the aircraft people want them because they carry a far heavier load than steel."

Discover Rutile Vein

The Mexican titanium deposit is the "baby" of Donald B. Gillies, Republic's agile 82-year-old mining consultant and retired vice-president. Like the 49ers of California gold rush days, the rutile was first noticed in rivers and streams as early as 1942. At least four major U. S. firms explored it in the last few years but aban-

doned it because of the rugged terrain.

Mr. Gillies and his associates in September 1953 followed it up the sides of hills and found the sources on a common band at 4200 ft. Small holes were dug and samples taken which indicated a 75-ft-wide strip. A vertical vein was then found running at least 500 ft down and 60 ft wide. This will make it the only rutile deposit in the western hemisphere being mined as a vein.

Although existence of the titanium in the general area was known for years through iron and gold explorations, Republic's prospecting was the first to prove the deposits adequate for exploitation.

The mining rights are owned outright by Republic. The Mexican government will be paid a tonnage export tax as yet undecided and property taxes are nominal with a 5 year exemption to start.

Employment at the mill will be largely Indians of the ancient Zapotec tribe. About 500 to 800 will eventually be employed. Top miners are paid up to $3 per day.

Only other work in the sparsely populated area is coffee picking. The area produces about 20,000 tons of coffee annually, worth $6.5 million, which is shipped to San Francisco. Coffee trucks made the 35-mile trip to Puerto Angel in 10 hours with 5 to 7-ton loads. Titanium ore loads would be comparable.

World's largest current rutile producer is Australia which exports large quantities to the U. S. Other major producers are French Cameroon, India and Norway. In the U. S. it is mined from beach sands at Jacksonville, Starke and Melbourne in Florida.

ROAD HUGS mountain. Burros are typical transportation in area.

INSIDE MINE. At right is Ward H. Broadfield who'll manage operation.

Largest producers of the lower grade ilmenite are the U. S., India and Norway. New York State has the largest resources in the U. S. with others in production in Florida, Virginia, North Carolina and Idaho. Over 2 million tons have been shipped from beach sands in India since 1922 with heavy exports to the U. S. until World War II. Russia also has large deposits of both rutile and ilmenite but extent is unknown.

Industry's Plans

Two current commercial U. S. producers of titanium sponge are Du Pont and Titanium Metals Corp. with 3600 tons annual capacity each. Other announced plans would raise U. S. capacity to 22,500 tons of sponge in 1956.

Cramet, Inc. is building a 6000-ton, $25 million plant at Chattanooga. Dow Chemical is working on an 1800-ton per year plant at Midland, Mich. Electro Metallurgical Co. plans a $31.5 million sponge plant at Ashtabula, O., to be completed in 1956 with 7500-ton annual capacity from sodium reduction of titanium tetrachloride.

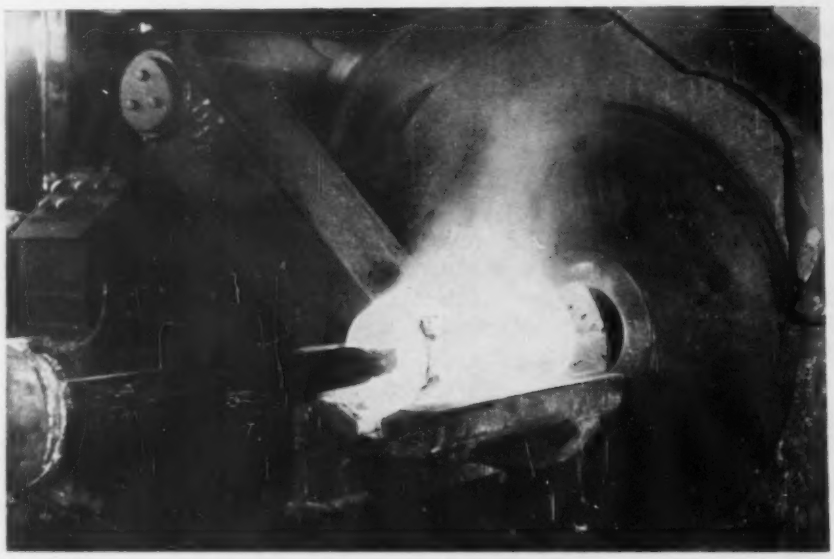
Horizons Titanium Co. is also constructing a pilot plant for electrolysis of potassium titanium fluoride at Stamford, Conn. Western Pyromet Co. of Richmond, Calif., is scheduled to use a portion of the wartime magnesium reduction plant at Manteca, Calif., for production of 6000 annual tons by a modified Kroll process. Glidden Co. of Cleveland also recently disclosed plans for work on reduction of the wonder metal.

Japan is a major foreign titanium sponge producer with some being exported to Republic Steel. Production is also in the pilot stage in England, France, Norway, Sweden, Italy, Switzerland and West Germany but the U. S. holds a commanding lead.

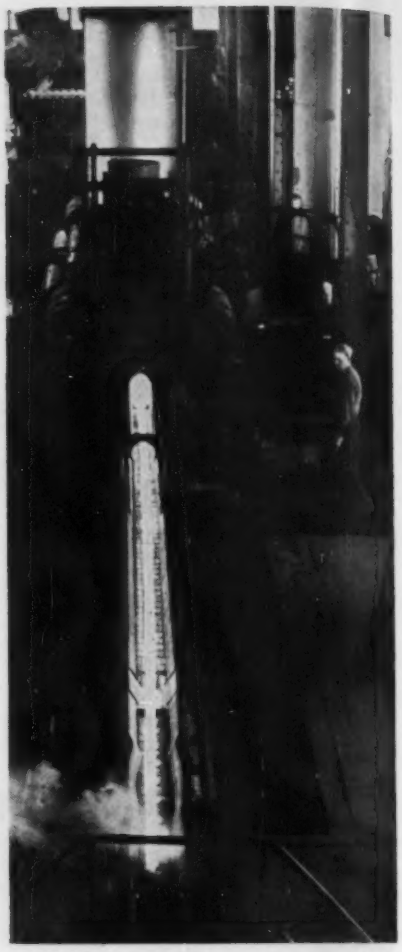
U. S. production of sponge in 1954 will be about 6000 tons compared to 2250 tons in 1953 and half that in 1952. Government goal for 1957 is 37,500 tons and requirements of 100,000 tons annually by 1960 have been predicted by Defense Dept. Over $128 million has been authorized for expansion.

Extrudes High Pressure Tubes

Babcock & Wilcox hot-extrudes and cold-finishes stainless steel tubing for plastic production . . . Used in service at 30,000 psi, 375°F temperature.



HOT BILLET as it enters container. Mandrel, at left, will force steel through die at opposite end of container. ID determined by mandrel.



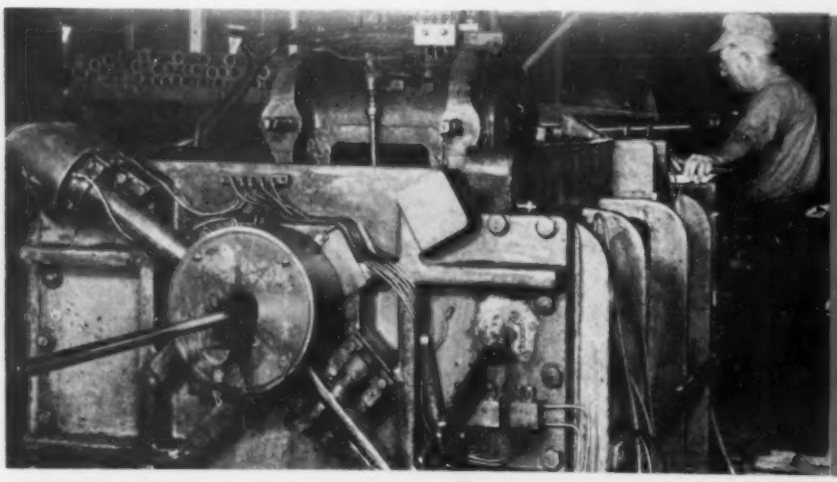
HEAVY steel tubing emerging from die onto runout table.

◆ PLASTIC manufacture sometimes calls for pretty rugged equipment. As an example, the polymerization step in the production of polyethylene takes pressures of up to 30,000 psi at 375°F. Equipment must also remain free of corrosion.

For this sort of service, Babcock & Wilcox's Tubular Products Div. supplies straight chrome stainless steel (Type 410) tubes to the following minimum specs: Tensile strength, 100,000 psi; yield strength, 70,000 psi; and elongation in 2-in. length, 16 pct. OD is 1.344 in. and wall thickness is 0.360 in. Normally supplied lengths run to about 28 ft. B & W notes that foreign sources can supply only shorter lengths which require more expensive fittings.

Production is by hot-extrusion (Sejournet process), cold-finishing and heat treating to obtain mechanical properties.

In a pressure test to 80,000 psi it was necessary to machine off half of the wall thickness to force rupture of the tube.



ROTO-ROCKING operation cold-finishes the heavy walled stainless tubing, which is heat treated to 70,000 psi minimum yield strength.

OILING tubes after inspection. Next step is packaging and shipping.

BRITAIN: Has Steel-Backed Prosperity

Wave of prosperity sweeping Britain is largely dependent on steel ... And steel is being sustained by large volume of exports from steel consuming industries . . . Export volume is expected to increase.

◆ THE REMARKABLE growth in exports of machinery, vehicles and goods since World War II has been the sustaining influence of Britain's steel industry and accounts for much of its prosperity today. Riding high on a wave of industrial prosperity, Britain's economy is sustained by a steel industry which in turn is bolstered by unparalleled exports of steel consuming industries.

Of this year's steel deliveries, "indirect exports" in the shape of motor vehicles, machinery, ships and other products of the metal-processing industries will absorb as much as 20 pct. Direct exports will account for about 15 pct. Thus the demand for British steel is strengthened even more by sales of metal manufacturers in overseas markets than by the export of steel as such. These indirect exports have shown a considerable expansion in the post-war period, in spite of a sharp setback after Korea, and are expected to advance further in the future.

Metal Exports Grow

In 1938, the metal-using groups represented 28 pct of the value of all British exports. Value last year represented nearly 45 pct of all United Kingdom exports; 1954's total will be still higher, an indication first of the efforts made by steel processing industries to expand overseas sales and second, of the relative decline in such traditional export items as coal and textiles.

Expand Faster

To some extent, of course, value figures are misleading, because prices have risen sharply since 1939. However, in terms of value at constant prices last year's exports by steel-using groups were roughly three times the 1938 level. By contrast, all other United Kingdom exports combined showed an increase of only 25 pct.

In other words, rate of expansion in the metals group was eight times that of all other exports. Growth of these industries' overseas sales has been one reason for the persistent demand for steel, resulting in the highest production ever this year.

Over three-quarters of the exports of the steel-processing industries by value consist of machinery, motor vehicles and aircraft. Manufacture of metals, which includes the relatively simple items such as hardware, hollowware, wire products, bolts, nuts, etc., comes next, followed by railroad equipment and ships.

The value of the product per ton of steel consumed differs greatly from group to group. Last year, a ton of steel turned into wire or wire manufactures for export brought in an average of about $250; converted into tools, implements or cutlery, the resulting steel could be sold overseas for over $1500. And, to take the extreme case, exported aircraft brought in well over $8500 for every ton of steel consumed in their manufacture. In comparison direct exports of steel realized $190 a long ton.

Then the most desirable exports from the standpoint of the balance of payments would be those with the highest value per ton of steel and other materials.

But the country cannot live by exporting only the products with the highest conversion value, the market is not big enough. It must, of necessity, sell unfabricated steel itself, as well.

Value of British Steel Exports

Estimated value per ton of finished steel exports, based on 1953 quantities and values.

	$
Fabricated sections and structures	224
Wire products	252
Rivets, bolts, nuts, etc.	266
Hardware, hollow-ware, etc.	392
Ships, marine engines, etc.	476
Railroad cars, etc.	784
Motor vehicles and parts	1064
Machinery, etc. (exc. marine)	1400
Tools, implements, cutlery	1456
Electrical equipment	6020
Aircraft and parts	9520
Weighted Average	1120

Autos Take Most

Nevertheless, steel needed in recent years in the manufacture of goods for export has exceeded direct exports. Indirect exports of steel rose from under 3 million ingot tons in 1948 to roughly 4¼ million in 1951, fell away to 3¾ million last year and recovered to a rate of over 4 million in the first half of 1954. Direct exports of steel last year were about 2¾ million ingot tons.

The three industries which head the list of indirect steel exporters are those with the greatest dependence on overseas markets. In the auto industry one-half of the steel consumed is absorbed by export production. The proportion is a little less than 40 pct of the total for mechanical engineering uses; nearly 30 pct for shipbuilding and electrical engineering; 20 pct for the wire industry.

Appliances:

Final '54 sales will be well above earlier predictions.

The recent statement by Ralph J. Cordiner, president of General Electric, that sales for the company would show only a 5 pct decline in 1954 despite an estimated 20 pct drop in defense business confirms what steel sellers supplying the appliance market have felt since September.

National appliance sales, predicted for a 10 pct drop in 1954, will make a considerably better showing than early forecasts would indicate. GE appliance sales are running at a level equal to the record output of 1953. The same holds true for Westinghouse, another major producer. Hotpoint, a third major builder of large appliances, will run 5-10 pct ahead of last year's high. Frigidaire is up in several localities, and Norge is running well ahead of last year.

By mid-year, sufficient signs were in the wind to suggest that overall sales would run substantially closer to a 6 pct decline or less (THE IRON AGE, July 29). The first indicators had been reinforced by September, and October and November found a substantial upcurve in major appliance buying generally.

Manufacturers, who had been using the 10 pct decline figure in January to describe overall industry sales in 1954, were speaking of 7-10 pct. By last week the figure had dropped to 5-10 pct.

What is regarded by appliance industry suppliers as of greater importance: Finished goods inventories have consistently remained at rock bottom level throughout the year. In latter 1953, after an all-time record of first half selling, distributors did an abrupt about face, found their inventories too high, reduced intake by as much as 40 pct.

Going into 1955, distributor inventories are regarded as "fair" to "low" and the factory sales rate is still continuing to rise. As of last week, sales chiefs in the midwest were confiding that the normal seasonal drop in major appliances, notable in December and January, has arrived with sales holding well above "normal year" levels. With major appliance sales at an unseasonal high, distributors are reporting pretty much the same thing, after almost unanimous pessimism in first half.

Power:

Chicago current restored after turbine explosion.

For the second time in as many months, the flow of electric power to Chicago's industries was interrupted. Early Monday morning Commonwealth Edison's giant (600,000 kw, capable of supplying the electric current needs of a city of 1,200,000 persons) Ridgeland plant was ripped by an explosion that knocked out three generator units and heavily damaged a fourth.

Though damage amounted to $10 million at least, three of the station generating units were back in action by midweek and a 25 pct power cut to firms serviced by the station had been lifted Wednesday. Electric power users in the South Chicago area had earlier taken a short 50 pct power cut recently when record floods invaded Commonwealth Edison plants.

By Tuesday noon three generating units, each consisting of two generators and attached turbines, were supplying current. On Monday Commonwealth Edison had requested that 100 major power users cut consumption by 25 pct. On Tuesday several hundred consumers, over an 11,000-sq-mi area, were reducing their power intake.

By Wednesday, service had been restored.

Beyond the immediate total loss of the turbine in which the explosion is believed to have occurred (described by Edison only as "possibly a metallurgical defect"), main damage to the equipment was caused by shrapnel from the disintegrating turbine.

IRON & STEEL: November Output By Districts

As reported to the American Iron and Steel Institute

BLAST FURNACE— NET TONS DISTRICTS	Annual Capacity	PIG IRON Nov.	PIG IRON Year to Date	FERROMANG., & SPIEGEL Nov.	FERROMANG., & SPIEGEL Year to Date	TOTAL Nov.	TOTAL Year to Date	Pct of Capacity Nov.	Pct of Capacity Year to Date
Eastern	17,261,850	1,058,927	10,910,322	13,494	178,014	1,072,421	11,088,336	75.5	70.2
Pitts.-Yngstn.	29,501,270	1,772,363	17,951,626	21,757	224,844	1,794,120	18,176,470	73.9	67.3
Cleve.-Detroit	8,714,680	608,390	x5,427,496			608,390	x5,427,496	84.8	68.0
Chicago	16,371,250	1,109,111	11,340,266			1,109,111	11,340,266	82.3	75.7
Southern	6,273,080	397,259	4,427,999	12,245	98,172	409,504	4,526,171	79.3	78.8
Western	3,879,260	256,396	2,534,107	4,958	7,912	263,354	2,542,019	82.5	71.6
TOTAL	82,001,390	5,204,446	x52,591,818	52,454	508,942	5,256,900	x53,100,760	77.9	70.8

STEEL— NET TONS DISTRICTS	Annual Capacity	TOTAL STEEL Nov.	TOTAL STEEL Year to Date	Pct of Capacity Nov.	Pct of Capacity Year to Date	Index** Nov.	Index** Year to Date	ALLOY STEEL* Nov.	ALLOY STEEL* Year to Date
Eastern	25,864,060	1,655,382	16,102,241	77.8	68.0	123.4	107.8	113,356	917,566
Pitts.-Yngstn.	44,348,060	2,803,993	27,582,437	76.8	68.0	102.2	90.3	384,784	3,696,036
Cleve.-Detroit	12,791,780	860,249	7,900,761	81.7	67.5	145.4	119.9	72,781	582,190
Chicago	27,371,700	1,884,082	18,796,236	83.7	75.0	125.1	112.1	120,268	1,053,536
Southern	6,932,340	408,926	4,757,420	71.7	75.0	121.2	126.7	2,971	63,348
Western	7,022,470	476,795	4,885,484	82.5	76.0	131.0	120.5	9,372	75,822
TOTAL	124,330,410	8,089,427	80,024,579	79.1	70.3	117.5	104.4	703,532	6,388,498

* Included under Total Steel.
** Based on average production of the three years 1947 through 1949 as 100.
x Revised.

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Report To Management

Let's Have Another Bad Year
What we need is another good old fashioned recession—like in 1954. So long as we keep on having this kind of economic disaster the U. S. can't miss continuing to be the most prosperous nation in the world.

The final figures aren't in yet, but it's a certainty 1954 will go down as the second best business year in history. And this happened in spite of reduced defense spending and the fact that manufacturers were extremely long on inventories—a situation which took quite a long time to remedy.

When Business was Bad . . .
There was a time early this year when a lot of business experts, politicians and labor leaders were trying to panic the nation by conjuring up the spectre of a bread-line depression. Unemployment was rising, industrial production was falling, and manufacturers seemed to be making little headway in their battle to reduce inventories.

But the public refused to buy the spiel of the pessimists. They kept on spending, and this, along with record-breaking construction activity, helped prevent the recession from spiraling into a really serious economic crisis.

Another stickout factor during 1954 was the way the President refused to choke up in the clutch. There was a lot of pressure on him from both his critics and his supporters to let loose a huge government spending program in order to stem the recession trend.

But the Administration maintained the nation wasn't so bad off as the professional wailers were claiming. The President said the decline would come to a halt in the spring, that it wouldn't be necessary to start an all-out government spending program to bring about an economic pickup.

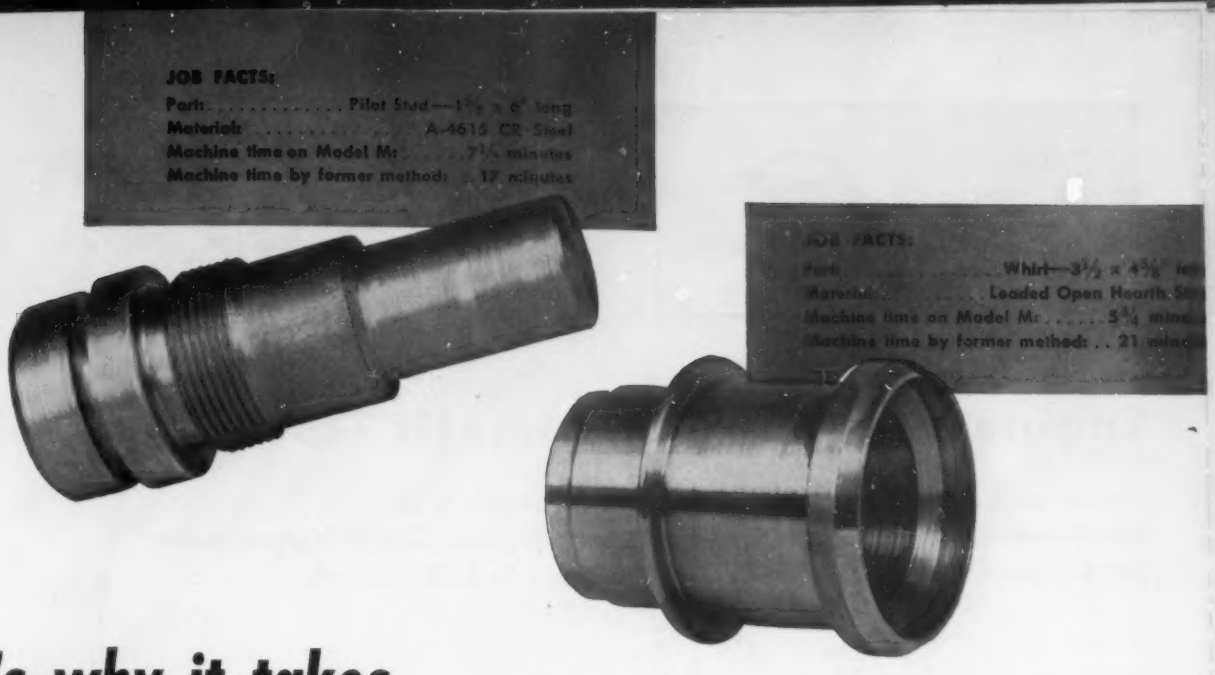
Later events proved he was right. At the time it was a very big gamble, but he won. And don't underestimate the important psychological effect of the Administration's strong show of confidence. If the President had weakened and given in to those demanding a big government spending program, it might have caused the public to think things were really bad, that it was time to stop spending and save everything to ride out the storm. If this had happened, it would probably have more than nullified the effect of a government spending program.

What Were the Highspots of '54
Looking back on 1954 there were a number of trends which made the year unique in U. S. economic history. One of the marked peculiarities was the fact that though we were in a recession for a good part of the year, manufacturing, wholesale and retail prices remained remarkably stable.

This was contrary to the usual trend during an economic decline, as past practice has been for businessmen to cut prices in hopes of turning the sliding sales trend. This frequently has a reverse effect since customers often hold off buying in anticipation of further price reductions. But this year business and industry held the line on prices and waited for a pickup. It proved a smart move.

Other important trends that marked '54: (1) Labor was remarkably stable during the year. Most of the major industries achieved contract settlements with surprising ease. (2) Running counter to the recession trend, construction industry had its best year ever. (3) Plantwide vacation shutdowns became standard practice.

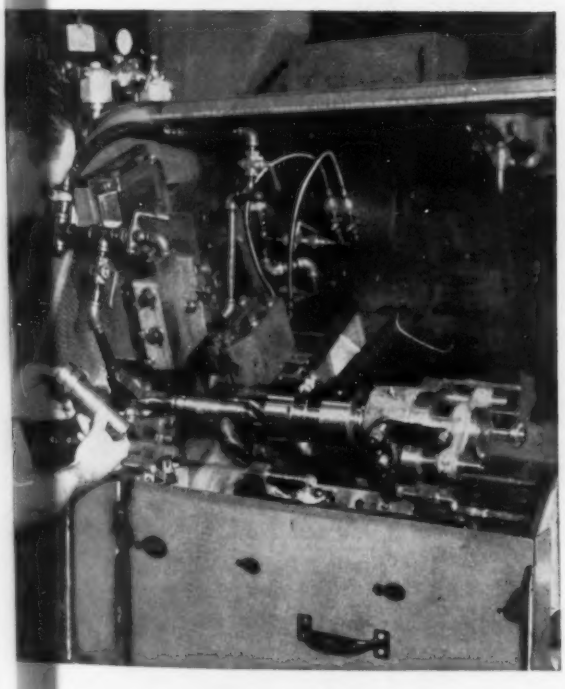
And one of the most important things that happened during 1954 is the fact that it set the stage for a really good business year in 1955. The inventory reduction which at times caused some pain and strain during '54 can't miss having a good effect on business during the coming year.


JOB FACTS:
Part: . . . . . Pilot Stud—1⅝ x 6" long
Material: . . . . . A-4615 CR Steel
Machine time on Model M: . . . . . 7½ minutes
Machine time by former method: . . 17 minutes
JOB FACTS:
Part: . . . . . Whirl—3½ x 4⅛"
Material: . . . . . Leaded Open Hearth
Machine time on Model M: . . . . . 5¾ min
Machine time by former method: . . 21 min

here's why it takes

more than just speed

to keep production on schedule

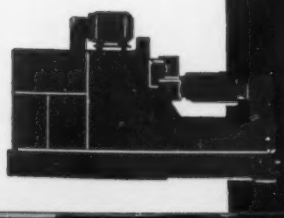


It's one thing to be able to machine a steel part at the fastest practical speeds and feeds. But speed without dependable control is wasted. You get both speed and control with **MODEL M SINGLE SPINDLE AUTOMATICS.**

Take the parts shown. In both cases, the completed pieces are machined automatically at their same predetermined rate every time, without interruption. In the long stud there are 11 operations including threading—the piece is completed on the Model M in less than half the time of the former method. In the other piece (with a large hole partway and a small one the rest of the way) spindle speeds are changed automatically during the cycle to provide the best speeds and feeds for different diameter cuts—and the time for a finished piece is less than ⅓ that of the former method.

Why not get all the facts? Write for Catalog M-50A. Or, better still, ask our engineers to talk with yours about your production jobs—long or short run.

Nothing can so completely destroy profits as the continued use of obsolete equipment.



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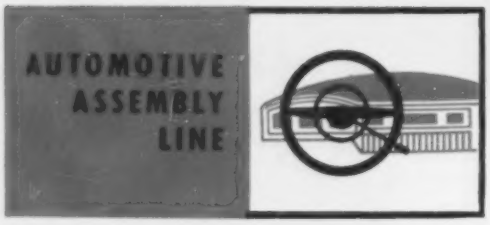
1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • Limit, Motor Starter and Control Station Switches • Solenoids • Contract Manufacturing.



Engines Get Fast, Automatic Tests

Station built into assembly line gives new auto engines a 20-minute workout . . . Automatic dynamometer at Chrysler's Canadian plant checks power, speed, condition of five different engines—By *R. D. Raddant.*

◆ ONE OF the questions most frequently asked by visitors to Detroit auto plants is: "How long has the engine of my new car been tested?"

It's a source of great surprise for most to learn that the engine which they expect to perform faithfully and flawlessly for anywhere from 10,000 to 100,000 miles, is actually tested only about 20 minutes.

Longer Test Impossible . . . Of course, it would be impossible to test an engine much longer and not require acres and acres of test stands considering the tremendous rate of auto production.

The key to this rapid and successful testing is the engine test stand that each newly assembled engine is connected to. Here it is run for a few minutes, and accepted or rejected in near-automatic fashion.

In some of the newer engine plants, engines do not even leave the power and free conveyor when they are tested. The conveyor comes to rest over the stand, the connections are made and the test is run with the engine still on its hook.

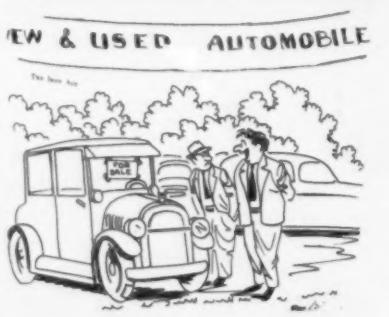
Use New Dynamometer . . . A new, load-type dynamometer for engine testing just developed by The George L. Nankervis Co., Detroit, for Chrysler of Canada, is a good unit to use as a backdrop to describe the testing process and what is done during the important 20 minutes in which your engine is either accepted or rejected.

This stand differs in one respect from a typical test stand in that at Chrysler's Canadian plant the single stand must test all five basic Chrysler engines and the 25 modifications that make up the complete line. This is a comparatively simple job with the operator making adjustments on the stand so it "knows" which engine is on the setup.

Makes Automatic Decision . . . This particular stand is designed for automatic operation and automatically accepts or rejects engines according to pre-set specifications. However, it can also be manually operated for more analytical testing.

On "automatic," an engine is put on the stand. Oil, water, gas, exhaust and electrical connections are made with rapid-acting connectors which enable an operator to ready the engine in seconds. The throttle linkage is then hooked to the carburetor and drive shaft coupled to the load.

Using its own starter, the engine is fired-up and allowed to run at idle speed with no load for a pre-set period. The attendant then checks the general operation and makes minor adjustments for timing and carburetion. Then speed is advanced and load applied. In engine testing, it is important to know horsepower at a given speed, independent of throttle position.



"Now, I'd like to see a 'second' car for my wife."

Loads Added . . . A brief run permits a period of wear-in for mating parts and a build-up to operating temperatures. The throttle is then advanced to wide open position and load increased. The dynamometer brake now loads or unloads until the engine is operating at the test rpm. At this speed, the engine must be developing a given hp to be okayed.

If it is too high or too low, the test is automatically terminated and a pilot light indicates "load reject." Multiple test rpm points can be pre-set and individually selected by a selector switch on the front of the stand. If the engine meets the requirements, the engine runs for a short period and then returns to idle. It is automatically drained of oil, gas and water and removed from the stand.

Takes Engine's Pulse . . . In addition to the automatic sensing circuits which accept or reject the engine on test, a visual indication is given of horsepower and speed. Gages also indicate manifold vacuum, engine oil pressure, water temperature, transmission oil pressure and generator output.

Low oil pressure, ignition fail-

Seconds Count...

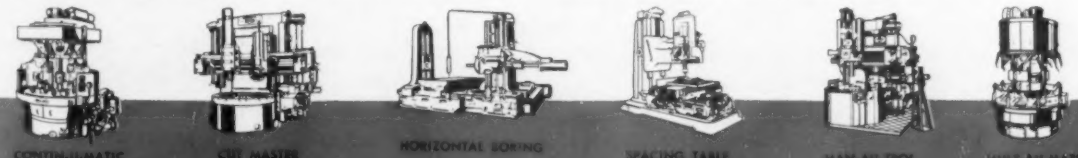
Time *is an Important Element in Profitable Manufacturing*

BULLARD MULT-AU-MATIC

Type "D" – 8"-12"-16" with 6 or 8 spindles
Type "D" – 16-23" and Type "K" – 6 spindles and 6 twin spindles – 8 spindles and 8 twin spindles

Hour after hour, the Bullard Mult-Au-Matic Method is proving its production capabilities in plants the world over in many and diversified industries. Years of constant development and improvement have proved the Mult-Au-Matic Method as a key unit for accurate and efficient repetitive production.

Seventy-three years of machine tool "know how" and craftsmanship have been skillfully combined in the Bullard Mult-Au-Matic – a machine that reduces manufacturing time and makes seconds count for profits. We invite your inquiries – write to your nearest Sales Office, Distributor or



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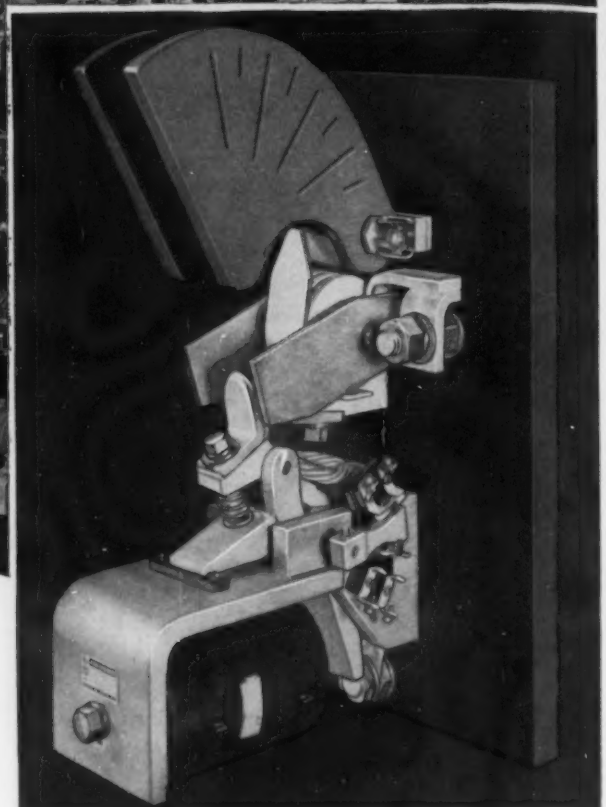
Where Severe Duty IS NORMAL DUTY



ALLIS-CHALMERS
Type 260 DC
CONTACTOR

HANDLES REPEATED OVERLOADS WITH EASE

Extra overload capacity . . . extra durability and reliability have been built into this heavy duty contactor — to make your roughest dc drive a smooth running, precision operation . . . to assure maximum production and quality with a minimum of outage time and maintenance. Principal component on the Allis-Chalmers constant potential panel, the Type 260 dc contactor is a rugged unit engineered to withstand punishing current surges inherent in steel mill auxiliary drive operation.

Here's Why!

●Quick quenching minimizes contact burning — Arc centering blowout uses thermal convection and magnetic action to stretch, cool and extinguish arc. Rapid circuit interruption minimizes burning and pitting of contacts.

●All current-carrying parts silver to silver — Main contacts are high density forged copper, plated with silver for dependability and extended life. Auxiliary contacts are solid silver . . . need no dressing.

● Magnet coil designed for continuous duty at 110% of rating — Coil layer wound with insulation between layers . . . vacuum impregnated to resist moisture and abuse. Operates contactor at less than 80% of rated voltage when hot. Holds at 20% of normal voltage.

● Other features. Rolling contact action. Arc handled on tips, current on clean heels . . . no destructive scuffing. Design simplicity eliminates troublesome linkages, arms and pivots. Lifetime *Oilite* shaft bearings need no lubrication. A-4326

SIMPLIFIED ROUTINE INSPECTION

Keeping the Type 260 contactor in top operating condition is merely a matter of preventive maintenance through routine inspection. All components are readily accessible. Arc chute lifts off to expose contacts which may be removed by loosening one bolt. Auxiliary contacts are mounted on contactor frame in full view. Operating coil is held by a single bolt.

For complete information, call your nearby Allis-Chalmers representative or write Allis-Chalmers, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

Automotive Production

(U. S. and Canada Combined)

WEEK ENDING	CARS	TRUCKS
Dec. 25, 1954	128,122*	18,899*
Dec. 18, 1954	157,261	22,605
Dec. 26, 1953	73,357	18,890
Dec. 19, 1953	104,621	27,472

*Estimated. Source: *Ward's Reports*

ure, excessive slippage in transmission, low water pressure, overheating and overspeeding will automatically terminate the test and flash a pilot light.

Sales:

Have not caught up with high production.

A moderate warning note on auto sales is reflected in an Automotive News dealer survey that indicates today's auto production is delivering more cars to dealers than dealers are delivering to customers.

December inventories show 255,756 cars in stock, an average of 6.2 cars per dealer. This is not considered an excessive inventory by any means. However, production is leaping to better than 150,000 passenger cars a week while the sales figure at the dealer level is considerably less than that.

Inventory Low

On the very bright side, the December inventory is only the third month since September 1952 that the figure was less than 300,000. It represents considerably less than the conventional 30-day inventory considered satisfactory by auto salesmen.

Nor are auto plants showing any signs of levelling-off their climbing production rates. U. S. auto and truck production reached an 85-week high at mid-December and last week 34 final assembly plants across the nation resorted to overtime, second shifts or Saturday work, according to Ward's Reports.

Among the production records was an amazing 38,795 passenger cars built by Chevrolet last week, compared to the previous division high of 37,739 during the week ended June 24, 1950.

Many car dealers can use the prosperity that is expected from the current rate of car buying. A National Automobile Dealers Assn. survey states that overall profits dropped to 1.7 pct of sales before federal income taxes for the first nine months of 1954.

Hardtops:

Now Buick will build them as 4-door sedans too.

A 4-door hardtop, really the first new automotive body since the 1949 introduction of its 2-door predecessor, will be turned out by Buick and Oldsmobile in early spring.

Some pilot models will be available for the Jan. 8 auto show in Chicago but dealers will take orders today for March delivery.

The 4-door construction will be confined at first to the General Motors "B" body, which means it will be offered in all Oldsmobile lines, but only Buick Special and Century. Buick Super and Roadmaster lines share the "C" body with Cadillac while Chevrolet and Pontiac use the same basic "A" body.

The striking feature of the 4-door hardtop is elimination of the pillars between the front and rear-door windows. This retains the sporty lines of the hardtop with the practical advantages of a 4-door sedan.

Rear doors are hinged to solidly reinforced, window-level center posts. The half-posts are of tapered, heavy steel construction designed to assure durability and eliminate any rattle.

Buick's Best Seller

The introduction of the 4-door hardtop indicates how far this type of styling has penetrated into the auto industry. This has been particularly noteworthy at Buick, which is the largest producer of hardtops in the world. Nearly 60 pct of Buick production is devoted to hardtop construction and nearly 260,000 were built by this division this year. It has almost eliminated the 2-door sedan from the Buick lineup, since it is now offered in the special series only.

THE BULL OF THE WOODS — **By J. R. Williams**

I WAS CHECKIN' ON THIS WHEN I BUMPED THAT CAN OF WASTE OIL!
AH, THERE YOU HAVE SUPERB NATURAL DIGNITY, UNRUFFLED EVEN IN A MESS! BOY, THAT TAKES YEARS OF TRAININ' AND SELF CONTROL!
NO, IT'S CONTROL OVER OTHER PEOPLE! EVERYBODY RUSHES TO DO THE UNDIGNIFIED STUFF FER HIM! ME THEY'D KEEP RUNNIN' AROUND IN MY BARE HIDE WHILE THEY HID ALL SPARE PANTS!
THERE IS A DIFFERENCE
12-31 J.R.WILLIAMS
T. M. Reg. U. S. Pat. Off.
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The Hottest News in Centerless Grinding in 30 Years

...the New Cincinnati Filmatic No. 2

New CINCINNATI FILMATIC No. 2 Centerless Grinding Machine. Catalog No. G-644.

Over thirty years of experience in building and tooling thousands of centerless grinding machines has guided the design and construction of the new CINCINNATI FILMATIC No. 2 Centerless.

No other machine tool manufacturer has this extensive centerless experience.

The new CINCINNATIS are more efficient, more accurate, more versatile than ever before. Time-proved Cincinnati advantages have been retained . . .

Bed-rock grinding wheel spindle mounting
Filmatic grinding wheel spindle bearings
Lower slide construction for workrest
Simplified method of truing regulating wheel

And now these additional advantages are included..

Infinitely variable regulating wheel speeds
Pre-loaded, precision ball bearing lower slide
Pressure lubrication of regulating wheel spindle bearings
Stabilized infeed screw

Of course, many more features desired by centerless grinder users are incorporated in the new CINCINNATI FILMATIC No. 2 Centerless Grinder.

Would you like to know more about them? Write for new Catalog No. G-644.

CINCINNATI GRINDERS INCORPORATED
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CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES • CENTERLESS LAPPING MACHINES • MICRO-CENTRIC GRINDING MACHINES

THIS WEEK IN WASHINGTON

Troop Cuts Won't Trim Buying

Military procurement will be unaffected by manpower reductions . . . Pentagon still plans $34 billion budget request . . . Carryovers could boost this to $36 billion . . . Drop 403,000 men—By G. H. Baker.

◆ PRESIDENT EISENHOWER'S decision to follow up the "more bang for a buck" military policy by trimming manpower is not going to mean a parallel cutback in procurement and contract awards. Spending for military hardware, particularly for aircraft and guided missiles, may even increase in the months ahead.

Defense Secretary Wilson made it clear last week in announcing the White House decision to boil down Army and Navy manpower that there will be no drastic changes in procurement. The Defense Dept. intends to present—as previously planned—a $34 billion military budget to the Congress.

$36 Billion Tops . . . A small amount of spending money carried over from this and previous fiscal years, when added to the anticipated $34 billion in new money, probably will result in about $35 billion to $36 billion in total military spending for the fiscal year that starts next July 1.

The Eisenhower-Wilson plan to cut troop strength will mean a total reduction of about 403,000 men from the Army and Navy (including the U. S. Marine Corps) during the next 18 months. Air Force strength will not be cut—it is to climb slightly. Money-wise, this means a saving of "a few hundred millions" in the remainder of this fiscal year, and savings of about $625,000,000 in the fiscal year starting July 1, Mr. Wilson predicts.

Check Spending Areas . . . Three sensitive areas of spending—consumption, producers' equipment, and construction—are being double-checked with unusual care by government economists these days.

These three areas are regarded as prime keys to industrial prosperity in 1955. Right now, expenditures in each of these areas is moving along at a healthy clip—and government economic experts intend to use every device at their command to keep the machinery of spending rolling at the same or better rate in the new year.

Spending for consumption is up moderately from the low point of late 1953 and early 1954. The number of employed persons has been rising at an optimistic rate. More money is in circulation. Spending at retail and wholesale levels during the Christmas shopping season was, for example, surprisingly strong.

Modernize Plants . . . Government surveys of anticipated spending for capital equipment and for private construction are similarly on the encouraging side of the ledger. Business and industry still are planning plant expansion and improvement on a hefty scale. It is estimated that a very large proportion of plant and equipment spending is for modernization, rather than for straight expansion.

This reflects the desire of firms in almost every industry to maintain or improve their competitive situations. Wise management figures that now is the time to strengthen competitive positions by installing new and more efficient equipment—not when business has slipped to the danger point.

Private construction continues to display surprising strength. Anticipated outlays for industrial and commercial building, as well as for residential building, are giving the construction industry something to cheer about. Contractors, it seems, are headed for another good year.

Study Plant Spending . . . Dr. George Terborgh, director of research, Machinery & Allied Products Institute, has been named chairman of a congressional study group evaluating anticipated plant and equipment expenditures. Together with four other study

New Military Manpower Goals

	Nov. 30, 1954	June 30, 1955	June 30, 1956
Army	1,343,000	1,100,000	1,000,000
Navy	692,000	665,000	650,000
Marine Corps	222,000	205,000	190,000
Air Force	961,000	970,000	975,000
TOTAL	3,218,000	2,940,000	2,815,000

Flash butt-welding of mill-rolled sections will save $186,888.00 this year for one jet engine manufacturer

By designing the mill rolled section shown above, instead of using a rectangular bar, 98 lbs. of metal per ring was saved. The cost of fabricating rings was reduced $77.87 per ring.

Are you using machined rings or bands? Rolling and flash butt-welding of special mill-rolled sections may be able to effect similar economies. Write today for complete information. Our Product Development Division will be glad to work with you.

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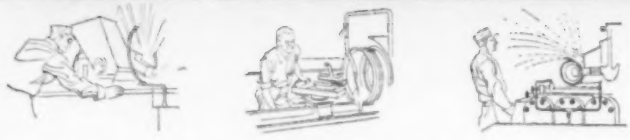

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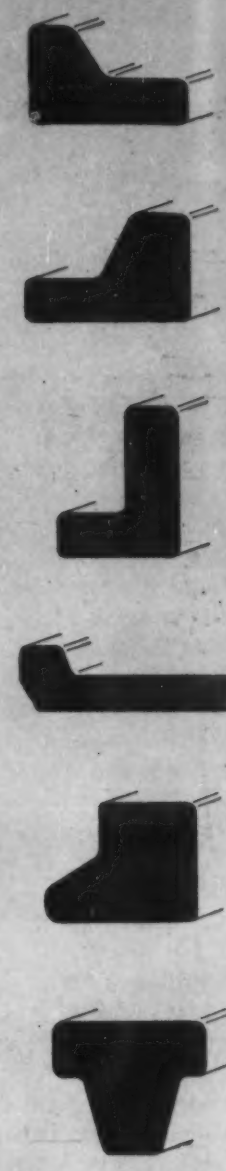
TYPICAL STAINLESS MILL ROLLED SECTIONS



Send for Free Catalog— of Production Facilities, 24-page booklet showing what American Welding can do for you.

group chairmen, he will report by June 30 to the Senate-House Economic Committee on ways to improve statistics in the field of capital expenditure expectations and other areas. Other study groups are to evaluate statistical data in the areas of savings, business inventories, and business and consumer expectations.

Serving with Dr. Terborgh will be Walter Hoadley, Armstrong Cork Co.; Irwin Friend, University of Pennsylvania; Miles L. Colean, economist; and William Butler, Chase National Bank.

Wages:

Ready federal minimum pay order for soft coal miners.

Labor Secretary James Mitchell is getting set to impose the first federal minimum wage for soft coal miners. The wage, he says, will be set at the industry's prevailing minimum.

Action follows requests for a minimum wage from United Mine Workers Union Boss John L. Lewis; George H. Love, president of Pittsburgh Consolidation Coal Co., and A. R. Matthews, president, Pocahontas Fuel Co., Inc.

The government is empowered under the Walsh-Healey Public Contracts Act to set minimum wages and other labor standards, such as overtime pay, child labor limitations and safety requirements, for all workers employed in industries providing materials or supplies under government contracts exceeding $10,000.

Mr. Lewis has asked for a minimum wage equal to the $18.25 daily basic wage provided in the UMW wage contract. Labor Department teams are surveying the industry to determine the "prevailing" minimum wages now paid.

In 1952, there were some 335,000 workers in the soft coal industry. This year, the government let 714 contracts for delivery of $95.6 million worth of soft coal and coke. Although the Walsh-Healey Act has been in effect for 18 years, it will be the first time that a minimum wage has been set in the soft coal industry.

Secretary Mitchell says he is taking the action "in the interest of preventing further (economic) weakening of the coal industry."

Procurement:

White House order clarifies Buy American requirements.

President Eisenhower will play a larger role in administering the "Buy America" Act—under which preference in bidding is given to domestic firms—under new orders from the White House.

The President, in a so-called "clarifying" order, directed all government purchasing agents to give contracts to American firms unless their bids are unreasonable. Unreasonable means that the bids are more than 106 pct of the foreign offer, including tariffs and costs, or more than 10 pct above the foreign bid, excluding tariffs and other costs. In the past, each agency has set its own standards of "unreasonable," some as high as 35 pct.

One main provision of the new order, however, permits an agency to consider a high offer from a domestic firm if most of the materials will be produced in areas of "substantial unemployment," or if national security is involved.

Agency heads, however, cannot determine on their own where national security interests are involved, and the Secretary of Labor along with the President determine where unemployment is an acceptable excuse for exceeding the new definition of unreasonable.

"That's the first dollar I ever made. Minus taxes, of course."

WASHINGTON NEWS

The President is asking department heads to stick to one method or the other in computing unreasonableness of high domestic bids. The new order is considered in some quarters as a concession to the State Department which needed a "declaration of intention toward lower trade barriers" to get concessions from other countries participating in trade discussions at Geneva.

New Boycott Ruling

National Labor Relations Board, by a split vote, rules that so-called "hot cargo" clauses in a labor-management contract do not necessarily permit a secondary boycott, but that the provision is legal when both parties uphold it.

Effect of the latest ruling is to permit employers to repudiate hot cargo clauses in contracts. Clauses permit employees of one firm to refuse to handle freight or goods going to or coming from another firm which the union employees have termed unfair.

Urge Sales Training

Efficiency in getting products from the factory to the consumer will be improved if more federal money is used for education in the distributive trades, the National Distribution Council says.

The Council has notified the U. S. Commerce Dept. it will put on a drive for allocation of a larger share of Office of Education funds for sales training. In addition, the group approves formal liaison between the Office of Education and Business & Defense Services Administration.

Another Council program is aimed at encouraging companies to complete and return to the government the census of business forms as early as possible in 1955.

One Council committee has the job of continuing to help BDSA in developing and promoting the Distribution Data Guide.

INDUSTRIAL BRIEFS

Congratulations . . . The Arthur Tickle Engineering Works, 21 Delevan St., Brooklyn, celebrated its 50th Anniversary at the Annual Executives Reception and Dinner earlier this month, at the Hotel Pierre, New York.

New Quarters . . . The Bristol Co., Waterbury, Conn., has moved its Application Engineering Department into a new office building addition recently completed.

Warehouse Completed . . . Federal Pacific Electric Co. has completed construction of a new and modern warehouse at its Newark, N. J. plant. The warehouse adds approximately 35,000 sq ft of space to the Newark plant.

Making Records . . . General Motors Corp., Detroit, reports that its passenger car divisions established new all time retail sales records for the first 10 days of December. GM dealers sold more cars during the first 10 days in December than for any similar period in history.

West Coast Agent . . . Machinery Sales Co., 2838 Leonis Blvd., Los Angeles, has been appointed as exclusive agents for Kent-Owens Milling Machines in Southern California, Arizona and Clark County, Nevada.

Gets Order . . . Blaw-Knox Co.'s Lewis Machinery Div., has received an order from Cochran Foil Co., Louisville, Ky., for three 62-inch wide aluminum rolling mills. They will be the first of this width to be built by Lewis.

Sales Office . . . J. C. Corrigan Co., Inc., Boston, will open a sales office at 420 Lexington Ave., New York, at the beginning of next year. Gilbert Lavoie will be sales engineer in charge.

Agreed to Buy . . . LeTourneau-Westinghouse Co., Peoria, Ill., agreed to buy the plant and assets of J. D. Adams Manufacturing Co., Indianapolis. The purchase agreement is subject to approval by Adams shareholders and "necessary corporate action as well as the adjustment of several legal and technical matters."

Acquired . . . Denison Engineering Co., Columbus, Ohio, acquired Delaware Industries, Inc., of Delaware, Ohio. The new plant will be used to produce component parts for the Columbus operation.

New Moniker . . . Sterling Grinding Wheel Co. is the new name of the former Sterling Abrasives Division of The Cleveland Quarries Co.

Acquired . . . Ueber Tool & Manufacturing Co., Detroit, has been acquired by Lunn Laminates, Inc. The purchase of this facility marks the entry of the Lunn Corp. into the tool and die industry as a major step in its expansion program.

Declares Dividend . . . Apex Smelting Co., Chicago, has declared a dividend of 25¢ a share on the common stock which was payable Dec. 28 to stockholders of record Dec. 20.

Sales Rep. . . . Salem-Brosius, Inc., Pittsburgh, appointed the W. P. Wooldridge Co. as sales representative in California, Washington, Oregon and Utah.

Dividend . . . National Lock Co. declared the regular quarterly dividend of 25¢ a share on the presently outstanding capital stock, payable Jan. 17, to stockholders of record Jan. 7.

They're Moving . . . Robertshaw-Fulton Controls Co.'s Grayson Controls Div. is moving Jan. 1 from its present plant at 3000 E. Imperial Highway, Lynwood, Calif., to a new factory at Long Beach Blvd., Long Beach Freeway, Long Beach, Calif.

Hear Ye . . . American Can Co. has created a purchasing department in its Atlantic Division with headquarters in New York. Activities of this new unit were formerly handled by the company's general purchasing department. Warren V. Duke becomes manager and Charles A. Schults is assistant manager.

New Prexy . . . Metal Cutting Tool Institute elected P. L. Houser as its president recently. He succeeds Mason Britton who has become vice-chairman.

Celebrating . . . Grand Iron Works, New York, is celebrating its 50th anniversary this year.

Occupy Building . . . Reichhold Chemicals, Inc. will now occupy the entire large, modern 2½-story building at 525 N. Broadway, White Plains, N. Y. The company has been occupying only the second floor of the building for the past six months.

Buying Stock . . . Westinghouse Electric Corp. reports that 20 pct of its employees are buying the company's common stock through payroll deductions.

Plan 2500-Mile Gas Pipeline System

Firm to bring 300 million cu ft of natural gas per day into U. S. from Canada . . . Will serve three coast states . . . Cost to be $300 million . . . Project starts in '55, needs 450,000 tons of plate—By *R. R. Kay.*

◆ CANADIAN natural gas for the West Coast, long sought and fought for, is a big step nearer reality.

If present plans for a $300-million, 2500-mile main pipeline system jell, western plate and pipe makers stand to get a solid piece of business out of the 450,000 tons of steel pipe that will be needed.

Canadian and U. S. companies quit battling and agreed on methods of tackling the problem. With Federal Power Commission approval, work could begin summer 1955. This would be a good break for the new pipe mill going up at U. S. Steel's Columbia-Geneva, Utah, works. Management at the company's plate mill, as well as at Kaiser Steel Corp.'s is sharpening its pencils and figuring tonnage.

Build 650-Mile Line . . . Here's the deal: Westcoast Transmission Co., Calgary, Alberta, Canada, will deliver 300 million cu ft of natural gas daily to Pacific Northwest Pipe Line Corp. A 650-mile pipeline will bring the gas from the rich Peace River area in northern Alberta and British Columbia to the U. S. border below Vancouver, B. C. This calls for over 200,000 tons of pipe, probably 30 in.

At the border, Pacific Northwest Pipe Line Corp. picks up and transmits 250 million cu ft daily to El Paso Natural Gas Co. at Mountain Home, Ida. From here this company pipes it to San Francisco for California distribution. The other 50 million cu ft daily will serve the Washington-Oregon area.

Plan 1200-Mile Network . . . Pacific Northwest Pipe Line Corp. already has FPC approval on a $160-million project for a pipeline web from the San Juan Basin, New Mexico, to Colorado and Utah, across Wyoming and Idaho, to Oregon and Washington. This calls for roughly 1200 miles of 22- and 26-in. pipe, about 200,000 tons. (See THE IRON AGE, July 1, 1954, p. 91.)

Some 50,000 more tons may go into linking the two systems.

Added to this huge need for pipe would be spur line requirements. Colorado Interstate Corp. has a permit for a 365-mile pipeline from Rock Springs, Wyo., to Denver. About 60,000 tons are estimated for this tributary.

Industry's Need Great . . . Additional natural gas will be welcomed by West Coast industry, which uses about 45 pct of current supply. Industry is first to be curtailed in time of shortage.

"I call it a wheel . . . I don't know if it'll amount to anything."

Increased availability would assure continued operation for manufacturers, and help develop new markets for industrial use.

See Quarter Up 10 Pct . . . Optimism among Western business leaders is high for 1955. Enthusiasm is general. Business will get off to a fast start. First-quarter results should be as much as 10 pct better. More than 85 pct of the manufacturers polled in the 11 western states by Prudential Insurance Co. of America expect business to be as good as or better than 1954. Optimism is especially high in the Idaho-Montana-Utah area. Manufacturing, construction, mining, and agricultural industries all look for increases.

Easterners Buy In . . . Easterners are staking more claims in the West. Western metalworking firms, meanwhile, are strengthening their own claims . . . Bell Aircraft Corp., Buffalo, N. Y., bought Hydraulic Research & Mfg. Co., Burbank, Calif., producers of small, lightweight, high-pressure hydraulic valves . . . Electra Motors, Inc., and California Gear Co., both of Anaheim, Calif., merged with Preco, Inc., Los Angeles. Electra makes industrial electric motors from ¼ hp to 75 hp and California Gear produces electronic products . . . California Metal Enameling Co., Los Angeles, bought the manufacturing facilities of Seaporcel Pacific, Inc., Long Beach, Calif., for manufacture of architectural porcelain enamel products.

Why Moly alloy steels are in your future

RIVET SET LIFE INCREASED 30 TIMES

with

Moly tool steels

the part	**RIVET SETS**
the problem	Steel for hot rivet sets must be resistant to shock and to softening on contact with the hot rivets.
the pay-off	A chromium-molybdenum tool steel with about 0.5% C, 3.2% Cr and 1.4% Mo has proved far superior to carbon tool steel. Most of the results obtained indicate rivet sets of this alloy steel will last 20 to 50 times as long as similar sets of carbon tool steel. In one specific instance, a hot rivet set of the chromium-molybdenum tool steel drove over 27 times more rivets than sets made of carbon tool steel. The alloy-steel rivet set was still in good condition after driving 43,094 rivets, while the carbon-steel rivet sets drove an average of only 1566 rivets under similar conditions before recupping was required.

If you make, use, specify or buy steels you need a copy of "ALLOY STEELS PAY OFF"

Such topics as:

Air valve stems on coal washers, anchor chain, annealing retorts, ball cages in universal joints, band saws, bolts, boring bars, bridges, bumpers for passenger cars, caustic evaporators, centralization feed pumps.

This big, fully-documented 207 page book gives more than 50 complete case histories high-lighting the many advantages of alloy steel usage... such as outlined above. And each case history is an idea-starter of its own! Everything from "ANNEALING RETORTS" to "TRIMMER BLADES". Get your copy today. Address Dept. **2**, on your letterhead, please. *Climax Molybdenum Company, 500 Fifth Avenue, New York 36, N. Y.*

This advertisement is printed in one shade of molybdenum orange, a pigment widely used for its striking color and good coverage — ideal for paint on industrial equipment . . . brings high visibility that means extra safety.

MS4-8

CLIMAX MOLYBDENUM

Tool Leasing Comes Into Its Own

Big development in machine tools during 1954 was stress on leasing plans . . . Frequently leasing programs have led to outright sales . . . How one manufacturer uses leased tools to build business—By *E. J. Egan, Jr.*

• WHEREVER machine tools are bought or sold, 1954 might come to be remembered as the year of the "big lease." During the 12-month period just ending, everal major builders offered a variety of tool-lease plans to their customers and prospects.

Most builders were somewhat surprised at the response. A great many unexpected prospects came to look at the equipment, asked a lot of searching questions about lease terms, tax deductions and the like. Many of them stayed to buy, passing up the lease idea for full cash purchases or eventual ownership via some form of easy payment plan.

Net result is that builders have frequently seen their lease ideas serve as stepping stones to full sales, with title passing to the buyer. This certainly seems the cheapest way to get a new machine tool if the money is available or can be borrowed at modest interest rates.

Leasing Works . . . But there have been many success stories involving just leasing, too. They're proof that the idea of "just renting the equipment for awhile" can be a good one, in some cases.

Judicious leasing is working well in the typical case of an aggressive jobbing machine shop in one Midwest city. The firm has a growing business, based on a successful record of going after tough jobs and making good on them.

Go to the Maker . . . The young management puts in a lot of time seeking better and cheaper ways to handle difficult but very profitable assignments that their competition shies away from. They don't wait for equipment salesmen to call If they see or hear of anything new they think they can use, they literally flood the manufacturer with demands for detailed information.

Any deals involving leasing are checked thoroughly since such an arrangement might prove to be the cheapest way to build some phase of the business. And it might also be the cheapest way to have modern equipment ready when and for however long it might be needed.

How to Decide . . . But there is always the question of what to lease and what to own outright. The answer at this shop lies in the potential work load that will be assigned any piece of equipment over a given time.

Actually, the firm owns many of its machine tools. Much of the equipment was bought second hand, some of it looks rather antiquated. The superintendent said, "Sure it would look nice to have shiny new machines all over the place. But most of the old stuff isn't used very often and usually for short runs at that. It's accurate enough, but no better than it has to be."

Means More Business . . . In contrast to these old machine tools, two new multiple spindle automatics are going almost all the time. These machines are leased from the builder. They're the very latest models, designed for quick change setups from job to job. And the precision work they've turned out on time has sold a lot of new business.

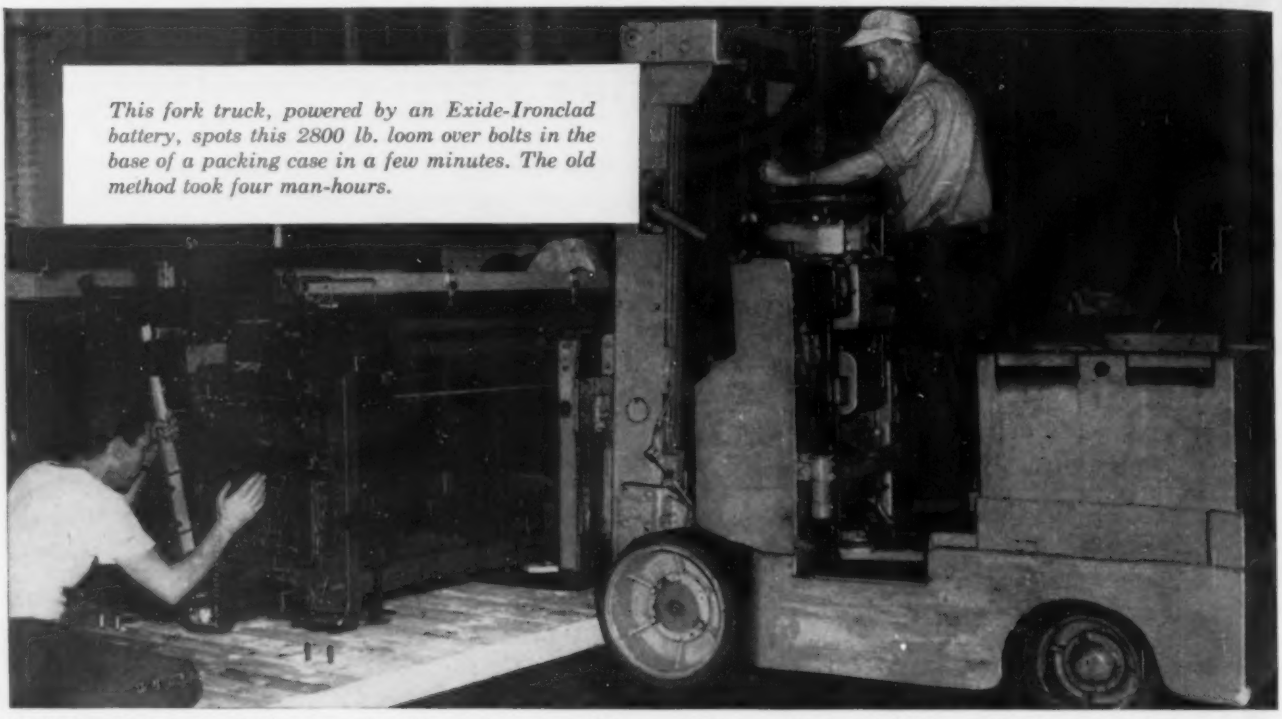
Leasing these automatics was not a case of financial necessity; the management preferred it that way. As soon as the builder produces a new model that will do more work in less time, the machines in current use will be returned. New ones will be leased to take their place.

Want the Best . . . The job shop looks at it this way: Where they're sure they can run a general purpose machine tool full blast they'd rather lease the best they can find. Leasing doesn't tie up a big chunk of working capital.

Since they're not actually buying, they can decide to lease a machine and put it right to work earning a profit. A buying decision might call for serious discussion over a long period.

GET FAST, SAFE HANDLING

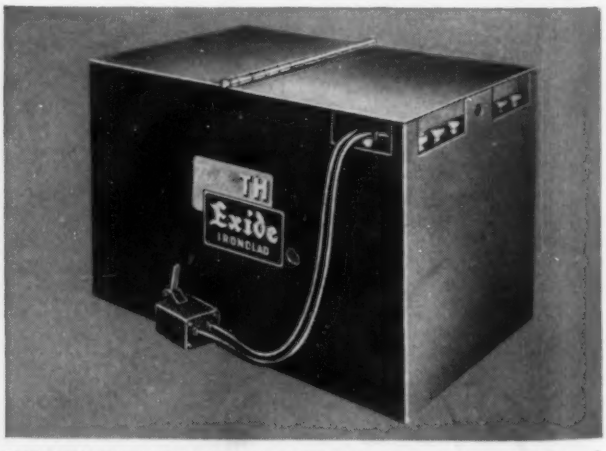
...with low cost Exide®-Ironclad® power!



This fork truck, powered by an Exide-Ironclad battery, spots this 2800 lb. loom over bolts in the base of a packing case in a few minutes. The old method took four man-hours.

YOU GET fast, safe and low cost handling when your lift trucks are powered by dependable Exide-Ironclad batteries. In addition, these rugged, long life batteries assure full-shift operations and high availability of equipment. Lower costs for operation, maintenance and depreciation make Exide-Ironclads your best power buy—AT ANY PRICE!

THE POSITIVE PLATES are the heart of any battery. Only Exide uses a slotted tube construction. By use of tubes, more active material is exposed to the electrolyte, providing *greater power*. Also, more active material is retained, giving *longer working life.*



THE NEW THRIFTY HAULERS! The improved industrial truck battery using *non-oxidizing* plastic power tubes for longest battery life, more capacity in the same space. For full details, call your Exide sales engineer—write for Form 1982 (Installation and Maintenance of Motive Power).

Your best power buy ...AT ANY PRICE!

Exide®
IRONCLAD BATTERIES

Exide INDUSTRIAL DIVISION, The Electric Storage Battery Company, Philadelphia 2, Pa.

The Iron Age SALUTES

Clifton T. Foss

A career marked by conspicuous achievements in the field of electronic development is due largely to his exceptional vision and ability to inspire and lead research teamwork.

Research is not normally a field where conspicuous examples of top managerial performance are found. A notable exception is Cliff Foss, vice-president of engineering and assistant general manager, Arma Div., American-Bosch Arma Corp., Garden City, N. Y.

It's difficult to appreciate the tremendous contribution Cliff has made to the pioneering advancement of precision instrumentation through his skillful management of Arma Div.'s engineering team.

Development programs carried out at Arma under Cliff's guidance and inspiration included the miniaturization and standardization of a whole new family of control devices such as small low-inertia servo-motors, precision tachometer-type generators and electrical resolvers.

Behind this development lay the idea that such a family of interchangeable electronic components could be mass produced, stock-binned and assembled to a variety of purposes in much less time. As the idea materialized it became possible to create "electronic brains" by stacking the components like so many building blocks.

Cliff came to Arma in 1933 as a development engineer, after several years with International Communications laboratories; steadily took on added responsibility 'til reaching his present position last October. Born in Sisseton, S. D., he received his electrical Engineering degree from the University of Wisconsin, where he also did graduate work.

At his home in Greenwich, Conn., Cliff exercises a considerable talent for outdoor cookery, specializing in thick steaks. He likes to do things around the house, finds relaxation in making things work better—even if he has to redesign and rebuild them. He has made life more enjoyable for his wife and four children by "do-it-yourself" projects of a considerable magnitude. His latest effort consisted of redesigning his forced-air heating system to eliminate noise and incorporate an air-conditioning system.

Good weather is liable to send Cliff out-of-doors as he's a diligent practitioner of the patient art of landscape gardening.

round the clock with CF&I-WICKWIRE WIRE

Let's take a look at a typical day in the life of John Q. Citizen—and of the part CF&I-Wickwire Wire plays in his everyday activities.

7:00 A.M.—BEDROOM. John's day starts with the ringing of his alarm clock. There's wire in the mattress and bedspring. In the lampshades and drapery hooks. Bobby pins, safety and common pins in his wife's dressing table—to mention just a few.

7:15 A.M.—NURSERY. Here's the crib from which young John helps the alarm clock to rouse his dad. No less than nine different kinds of wire go into its making. His toys and his tricycle, too—even the zippers on his clothes make use of CF&I-Wickwire Wire.

7:30 A.M.—KITCHEN. Let's inspect the kitchen. In the range and the refrigerator there are wire racks. The kitchen utensils, wire strainers, electric mixer, the egg slicer, the toaster, and dozens of other appliances all use CF&I-Wickwire Wire in their construction.

FOR THE WIRE YOU REQUIRE CHECK CF&I-WICKWIRE

Watch for the balance of John's day in succeeding advertisements that take him to his office, through his plant and finally home to his living room.

CF&I-WICKWIRE WIRE

2846

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The Iron Age
FOUNDED 1855
TECHNICAL ARTICLES

Low installation costs—

Castable Refractories: Where to Use Them to Best Advantage

By H. G. HART
Manager, Special Refractories Dept.
Harbison-Walker Refractories Co.
Pittsburgh

◆ Castable refractories have been tried for many different types of service over the years . . . Their best uses are now more clarified . . . Castables have been found most suitable in auxiliary parts to larger units and smaller furnace structures.

◆ Primary interest in castables is due to their convenience and ease of installation . . . They permit furnace operators to make their own quick repairs . . . Other advantages include resistance to thermal shock, low permeability and abrasion resistance.

EXTRA strength castable in hot blast valve after 4½ years service. Use of castable permitted quick repair and short downtime.

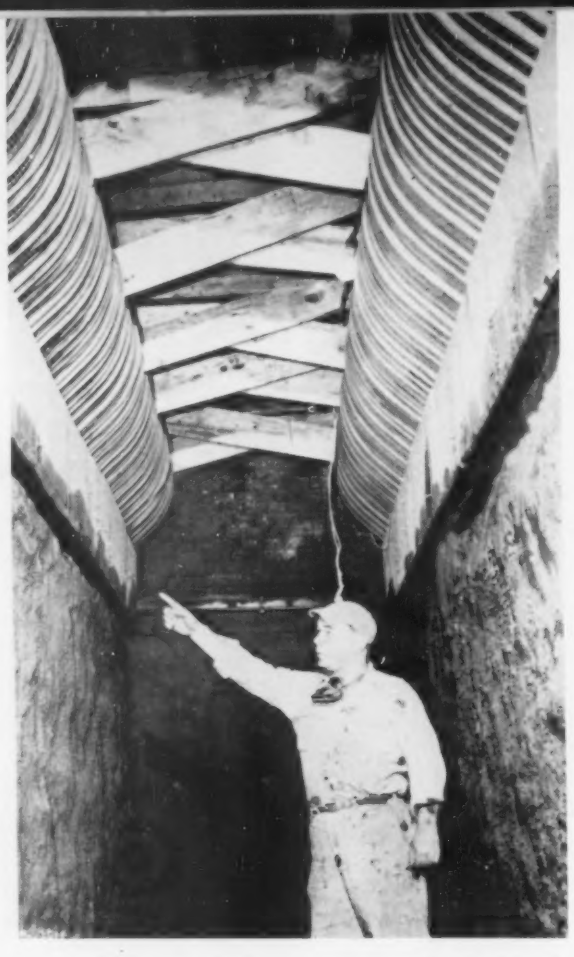
◆ A SHORT TIME after the commercial development of calcium aluminate cement in this country, it was tried as the bonding agent for granular refractories. Because of the method of application, refractories so bonded became known as "castables." Since then castables have been tried for many different kinds of service and as a result their most suitable applications have become more clarified.

Castables are not economical in applications where refractory brick are used in large tonnages in individual units.

Castables have established themselves both in adjuncts or auxiliary parts to the larger units, as well as in many relatively small furnace structures. In both types of applications, their chief use is maintenance.

In general, castables cost more per ton than prefired refractories. And in most cases the proper prefired refractory does the job as well as or better than a castable refractory. The question then arises: Why are castable refractories used?

Probably the primary interest in castable refractories is in their convenience and ease of



RESISTANCE to thermal shock and high degree of impermeability makes castables particularly suitable as lining material for ash hoppers.

installation. They can be poured like Portland cement concrete, they can be tamped in place, or troweled. Any one of these methods can be used with available labor. Also, with castable refractories, it is possible for the furnace operator in many cases to make his own quick repairs.

Next in interest is the relatively low cost of installation and maintenance of existing construction. Many operators find the use of castables in numerous applications results in short downtime for construction and repairs.

With castable installations, the relatively high cost of castables is often off-set by the comparatively low installation cost. Typical of this is the experience of one steel plant with a soaking pit cover installation. Although the super-duty type of castable required, increased the cost of material $25.00 per cover, the castable lining required only 18 man hours for installation.

Of even greater importance was the fact that the crew required only two hours to cast the cover and that the cover was ready for service only 24 hours later.

The ease of making an emergency repair quickly with castables, is shown by the method followed in relining a portion of a hot blast main and the connecting pipe from a stove in one blast furnace plant.

Some of the brick in the main near the connecting pipe opening had become loose and hot spots had developed. The brick in the connecting pipe lining and mushroom valve lining were also in need of replacement. To shut off the main long enough to cool and repair the brickwork in the normal way would have caused considerable production loss.

It was decided to replace the lining of the hot blast main and piping where necessary with a castable refractory that was particularly designed for high strength and resistance to abrasion. The loose brick were removed by raking them out while the main was still too hot for workmen to enter. Part of the brick lining was still intact on one side of the pipe. A wood form was inserted, resting against the brick on the one side and spaced at proper distance from the shell for the balance of the main.

High resistance to spalling

Through holes cut in the top of the main and at the pipe connection, the castable was poured and worked into place with rods. The valve stem lining was poured and the whole installation allowed to cure for a few hours. Thirty-six hours after the main was taken out of service it was back in service at full capacity.

Eight months later the lining was down for inspection. The castable installation was still holding tightly against the brick that had been left and had worn so little that the impression made by the grain of the wood in the forms could still be seen. This plant has now standardized on use of castable in their mains and connecting pipes.

One of the first outstanding characteristics noticed with early castable refractory installations was their high resistance to thermal shock spalling. In the superior castables made today, the property of spalling resistance has been greatly improved by research and study of grain sizing, type of aggregate, and other factors.

Makes good ash hopper lining

Resistance to spalling together with a high degree of impermeability to water or steam, makes castables particularly suitable as lining material for ash hoppers. Castable refractories of proper strength, made with good aluminous cements and hard burned refractory aggregate, are giving outstanding performance in these most severe service conditions.

The modern ash hopper for large boilers fired with slack or powdered fuel is a very important piece of equipment. It handles almost automatically many tons of hot corrosive ash every day. Most of these are used with cold water to sluice or sweep the hot ash and clinker to the dump or disposal equipment.

With some ash handling equipment, hot ash and clinkers accumulate in the hopper for several hours, subjecting the walls and bottom to temperature of 1500°F to 2000°F. When the

ADVANTAGES OF CAST REFRACTORIES

1. Convenient and easy to install.
2. Installation costs are generally low.
3. Repairs with castables can be quickly made.
4. Good resistance to thermal shock.
5. High resistance to erosion and abrasion.
6. Permeability of castables to gases is very low within certain temperature limits.
7. Castables of any class have relatively low thermal conductivity.

hopper is full, valves or sluice gates are opened, for sluicing and washing out the ash with cold water, which is under high pressure in some cases. The thermal shock on the hot walls is severe, yet many castable installations give years of service with a minimum of repair.

Resistance to thermal shock is also of major importance for car tops, billet and rod furnace floors, and pedestal furnace hearths.

Just as regular concrete withstands mechanical abuse at low temperatures, similarly refractory concretes resist abrasive and erosive wear at intermediate and high temperatures, depending upon the limits of each respective class.

GUNNING furnace interior with high alumina castable. Where practical this method eliminates form work and lowers labor costs.

Resistance to abrasion is, of course, a very desirable characteristic in blast furnace mains and downcomers. Another application where this characteristic is of importance, is in cyclonic dust removing systems.

Permeability of castables at temperatures up to 1000°F is extremely low. One extra strength type of castable tested at 1000°F has a permeability of zero at a pressure of 0.5 psi. Even some light-weight insulating type of castables may have a permeability of less than 0.05 pct up to 1000°F.

While materials of this type have a high porosity, the aluminous cement used as a binder effectively seals off the porous aggregates. forms closed pores, and prevents continuous passages through which air or gas may pass, particularly at low and intermediate temperatures.

Because of this characteristic, castable refractories are ideal for sealing outside walls of open hearth checker chambers against air infiltration. Many other furnaces, hot air flues and similar equipment may be made more efficient by relatively thin coatings of a suitable castable refractory. Applying castable for such applications is made economical by use of an air-placement gun, where possible.

Relatively low thermal conductivity is another reason for considering the use of castables. This feature often makes it possible to obtain the fuel economy desired by the engineer with reduced or possibly no insulation.

Low thermal conductivity, coupled with low permeability, greatly reduces heat loss and air infiltration, and results in lower fuel costs—an important item in many applications.

Refractory castables, originally designed for installation by mixing and pouring, are now being applied in an increasing degree by air-placement guns. This method of application in many cases eliminates costly form work. The air-placement method also gives greater density and strength with a resultant increase in resistance to abrasion over the cast method.

Eliminate removal of old lining

Application of castables with a gun also makes possible and practical the maintenance of refractory linings, whether brick, castable or plastic fire brick, without removing the old or damaged lining. Such procedure eliminates the cost of removing an old lining and, at the same time, reduces the total amount of refractory required for maintenance.

Shipments of castable refractories now amount to about 2 pct of the total value of all refractories used in the United States. A wide variety of commercial castables is available to meet various specific service requirements. They are usually grouped into the following general classes: Standard, Extra Strength, Super, High Alumina, Chrome and Lightweight.

In plating, anodizing, pickling—

External Exchangers Stem Chemical and Electrolytic Corrosion

◆ Use of external exchangers in heating or cooling plating, anodizing and pickling solutions overcomes chemical as well as electrolytic attack . . . The specific construction materials used are not attacked chemically by the particular solutions.

◆ In plating, electrolytic attack is eliminated by having the exchanger outside the tank . . . Units take no tank space, allowing for more plating capacity.

By CARL BUCK, Service Engineer
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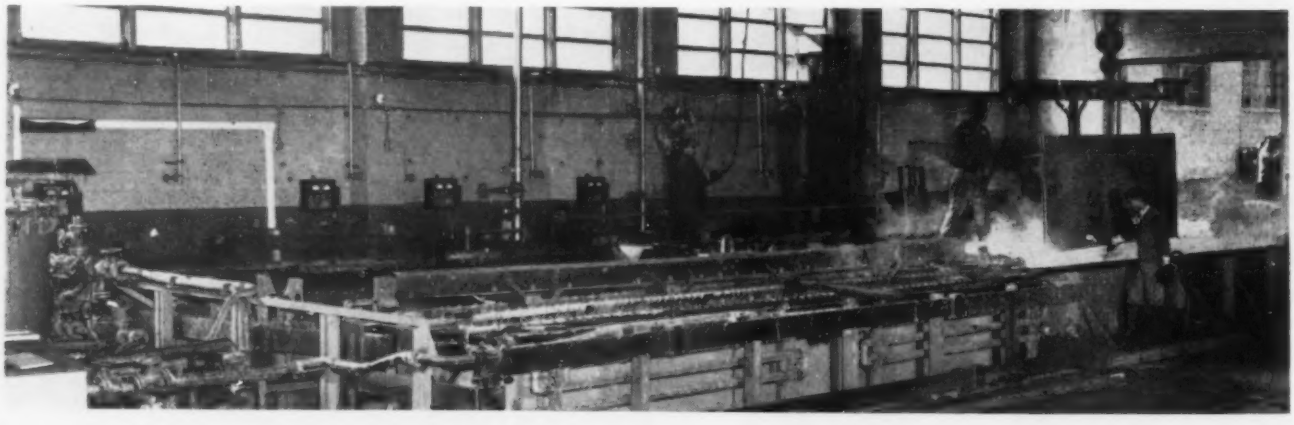

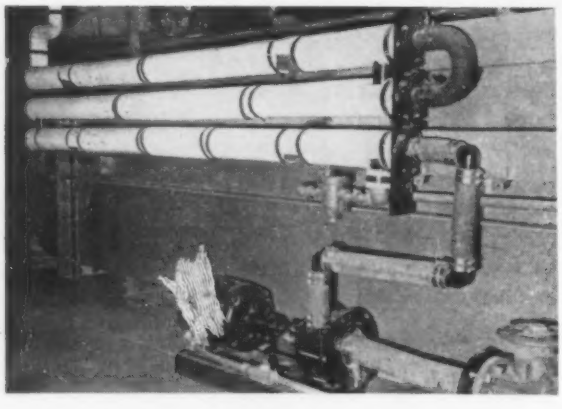

NICKEL PLATING installation is equipped throughout with external exchangers. No problems are encountered from corrosion—either chemical or electrolytic. System has high efficiency.

TYPICAL external exchanger unit for nickel plating from chloride bath consists of carbon-loaded furfural plastic pump and fitting, butyl rubber piping and impervious graphite tubes.

◆ CORROSION has always been a major problem in heating and cooling plating, anodizing and pickling solutions. This corrosion is of two types—chemical and electrolytic. Chemical attack can be overcome by the use of proper materials. One answer to electrolytic attack is to replace or substitute internal coils by external exchangers.

Use of external exchangers eliminates both types of attack. Exchangers produced by Carl Buck & Associates consist of an outer steel jacket and an inner tube made of a high heat transfer material which is resistant to the particular solution used. The exchanger system also includes a pump of the proper type and size to give optimum solution velocity through the exchanger tubes, hose or piping, and fittings, all made of materials not attacked by the solution.

Offer several benefits

In plating, external exchangers offer important advantages. Electrolytic attack, a big problem with coils, is eliminated by having the exchanger outside the tank away from the plating current. Another advantage is that they require no tank space, allowing full utilization for plating. Circulation provided by the exchanger pump is not only beneficial to the plating operation, but assures uniform temperature throughout the solution.

In anodizing, external exchangers have the same advantages over coils, plus more efficient heat exchange. Cooling loads are great in anodizing, and since much greater coefficients are possible in a counter current flow exchanger than in a coil, considerably less heat transfer surface is required.

The conventional method of heating in pickling has been by direct injection of steam through jets into the tank. External exchangers provide for more economical operation than by steam injection, and afford better control. Acid additions made necessary by condensate introduced through steam injection are eliminated. By eliminating this dilution, better control of acid concentration is possible.

Steam jets of metallic construction deteriorate rapidly through corrosion as well as erosion. On the other hand, nonmetallic jets are fragile. Both metallic and nonmetallic jets are subject to damage by simply being in the tank. Use of external exchangers removes these disadvantages.

A suitable exchanger depends on its long life to the use of specific construction materials for specific solutions. No one material is suitable for all solutions. For example, carbon-loaded furfural plastic pumps have shown excellent life for all acid solutions except chromic and nitric. For chromic acid and the cyanides, cast steel has proven more serviceable. For nitric acid and fluoride chrome baths, a cast high nickel-chrome stainless is preferable.

Exchanger Materials for Pickling and Plating Solutions

ALKALINE PLATING SOLUTIONS	Exchanger Tubes	Pumps	Alternate Pumps	Hose or Piping	Fittings
Cyanide	1	2	—	1	1
Stannate	1	2	—	1	1
Pyrophosphate	1	2	—	1	1
Amine	1	2	—	1	1
ACID PLATING SOLUTIONS					
Sulphate-low chloride	4	3	5	7	3
Sulphate-high chloride	4	3	—	7	3
Chloride	4	3	-	7	3
Fluoborate	4	3	—	7	3
Sulfamate	4	3	—	7	3
ACID PICKLING SOLUTIONS					
Hydrochloric	4	3	—	7	3
Sulphuric	4	3	5	7	3
Nitric	8	5	5	8	8
Chromic	1	2	5	1	1
High-speed chromic	9	6	5	7	6
Fluoboric	4	3	—	7	3
Hydrofluoric	4	3	—	7	3
Acetic	4	3	5	7	3
Dilute mixture of nitric and hydrofluoric acids	4*	6	—	7*	6
ALKALINE CLEANING SOLUTIONS					
Caustic soda	1	2	—	1	1
Trisodium phosphate	1	2	—	1	1
Soda ash	1	2	—	1	1
Silicates	1	2	—	1	1
Cyanides	1	2	—	1	1

1—Seamless drawn steel tubing. 2—Cast steel (not cast iron). 3—Carbon-loaded furfural plastic, fiber glass reinforced. 4—Impervious graphite. 5—Cast high nickel-chrome stainless alloy. 6—Polyester resin, Dynel reinforced. 7—Butyl rubber, fabric reinforced. 8—Stainless steel. 9—Tantalum.
*—Most economical material, limited service life.

Impervious graphite is best for exchanger tubes in acid solutions, except chromic and nitric. Seamless drawn steel is satisfactory for chromic acid and cyanide solutions. Stainless steel tubes are suitable for nitric acid while tantalum tubes serve best for fluoric high-speed chrome plating solutions.

Substantial cooling capacity is required for many of the newer plating, anodizing and pickling processes. None of the construction materials used for external exchangers are affected by thermal shock. Hence, they may be used for alternate heating and cooling.

Some processes require refrigeration to dissipate the heat generated by electrical input. Units for such applications combine compressors, condensers, solution pump, exchanger unit and cooling tower. Such units are made for any solution and for any capacity. They eliminate the need for chilled water or brine systems by directly expanding Freon in the solution exchangers jackets.

A base for comparison—

How Notch Sensitive Are Titanium Alloys?

◆ Titanium alloys containing vanadium show a strong relationship between notch sensitivity and alloy composition . . . Data on notch behavior were gathered from specimens subjected to various heat treatments . . . Radial strain gages were used to obtain strain data.

◆ Microstructure did not have an important effect on notch sensitivity . . . Notch strength tended to increase uniformly with greater notch depth . . . Notch sensitivity of a titanium-vanadium alloy compares favorably with an aluminum alloy of similar strength level.

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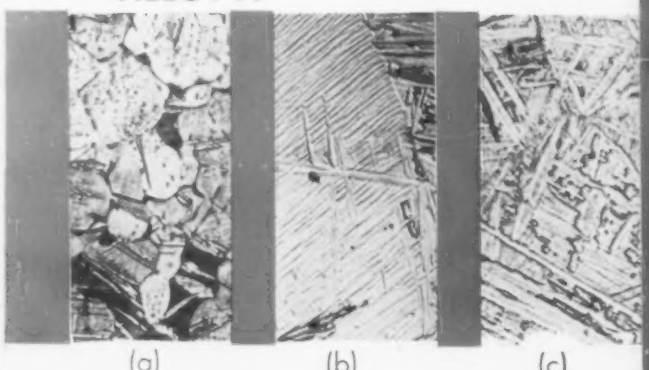
MICROSTRUCTURES of heat treated titanium-vanadium alloys. 250X

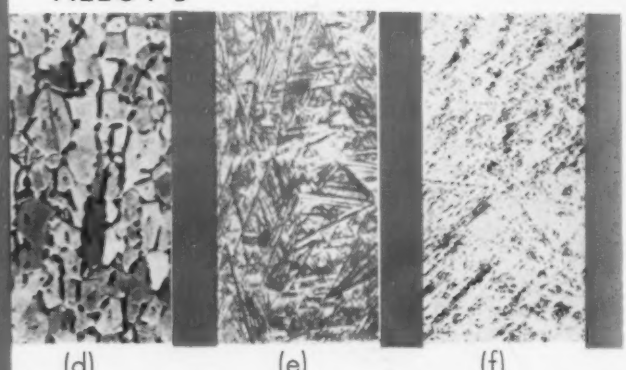
ALLOY A



(a) (b) (c)

FIG. 1a—Annealed at 800°C for 24 hours, equiaxed grains.
FIG. 1b—Water quenched from 1100°C, striated α grains.
FIG. 1c—Aged at 550°C for 16 hours subsequent to water quench. Modified acicular α structure.

ALLOY B



(d) (e) (f)

FIG. 1d—Annealed at 800°C for 24 hours, equiaxed grains.
FIG. 1e—Water quenched from 1100°C, acicular α structure.
FIG. 1f—Aged at 550°C for 16 hours subsequent to water quench. Modified acicular α structure.

◆ NOTCH SENSITIVITY of titanium alloys containing small amounts of vanadium appears to be strongly affected by composition, recent studies conducted by Case Institute of Technology indicate. This is one of several conclusions reached in research designed to provide some means of comparison of the notch behavior of titanium alloys with other structural materials of corresponding strength levels.

The detrimental effect of abrupt changes in section size on the ductility of structural members presents a problem of great practical importance. The decrease in ductility is generally attributed to the effect of a "triaxial tension stress state" associated with the abrupt changes in section size, as well as to the development of a stress concentration. This condition may lead to a sudden failure in normally ductile materials. The notch tensile test gives an indication of the effect of notch depth on the ductility (per cent reduction in area) and the ultimate tensile strength of the material. There is, unfortu-

* Prof. Brotzen was formerly Senior Research Associate at Case Institute of Technology.

nately, little published information on notch behavior of titanium alloys.

Notch sensitivities of two titanium alloys of commercial purity were investigated. The alloys used were arc melted from sponge titanium and hot rolled to 11/16 in. round bars. The compositions are given in Table I. The strength level of alloy B was substantially higher than that of alloy A, although the ductilities of the two were very nearly the same, Table II. Heat treatments, Table II, were designed to produce three different microstructures in each of the alloys:

(1) Annealing at 800°C for 24 hours yielded an equiaxed α-titanium grain structure in both alloys, Figs. 1a and 1d.

(2) Water quenching from the β region (1100°C, 16 hours holding time) produced a striated α grain structure in alloy A. Fig. 1b. Alloy B, on the other hand, revealed an acicular α' structure, Fig. 1e*.

(3) Aging at 550°C for 16 hours subsequent to water quenching (1100°C, 16 hours holding time) resulted in a modified acicular structure in both alloys, Figs. 1c and 1f*.

The tensile properties of both alloys, Table II, were not appreciably affected by the difference in microstructure.

Heat treated in vacuum

Notch specimens, Fig. 2, were rough machined prior to heat treatment allowing about 0.060 in. in diameter for removal of any possible contamination. As a precaution, all heat treatments were carried out in high vacuum, i.e., at pressure below 5×10^{-5} mm Hg. The specimens were then notched and machined to finish dimensions.

Strain data were obtained during the test by means of a radial strain gage located at the notch. Tensile strength and reduction in area

* Microscopic inspection revealed the presence of some carbides in alloy B both in the quenched and in the aged conditions.

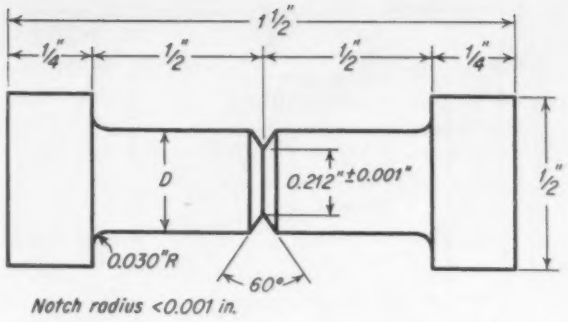


FIG. 2—Notch tensile specimen. Diameter D is determined by required notch depth.

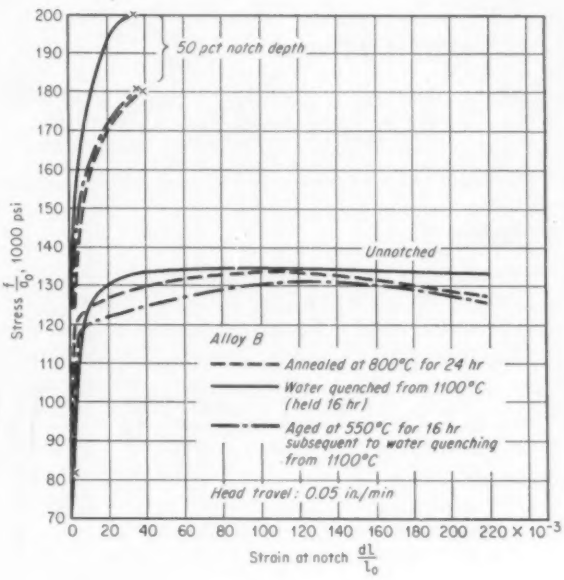

50 pct notch depth
Unnotched
Stress f/A0, 1000 psi
Alloy B
Annealed at 800°C for 24 hr
Water quenched from 1100°C (held 16 hr)
Aged at 550°C for 16 hr subsequent to water quenching from 1100°C
Head travel: 0.05 in./min
Strain at notch dl/l0

FIG. 4 — Typical stress-strain curves, notched and unnotched tensile specimens of Alloy B.

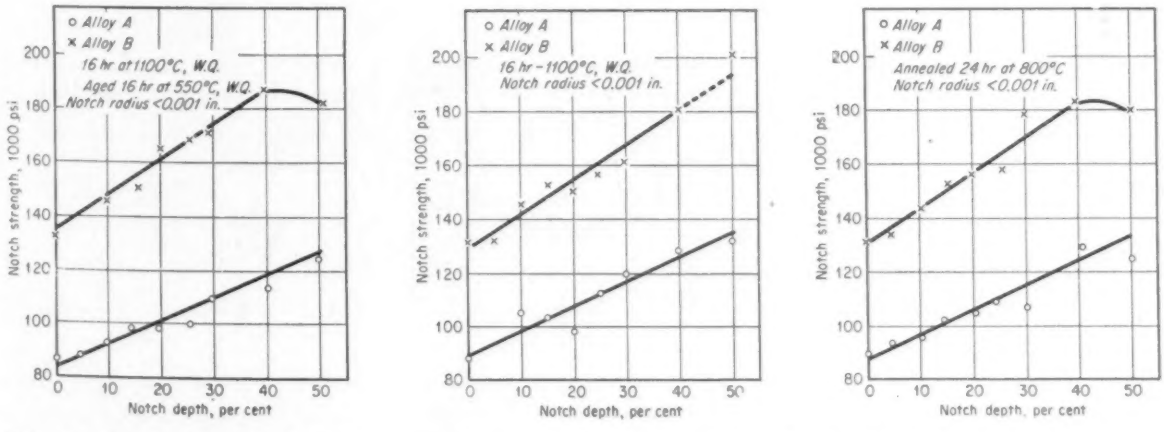

o Alloy A
× Alloy B
16 hr at 1100°C, W.Q.
Aged 16 hr at 550°C, W.Q.
Notch radius <0.001 in.
16 hr - 1100°C, W.Q.
Notch radius <0.001 in.
Annealed 24 hr at 800°C
Notch radius <0.001 in.
Notch strength, 1000 psi
Notch depth, per cent

FIG. 3—Notch strength of titanium-vanadium alloys subjected to varying heat treatments.

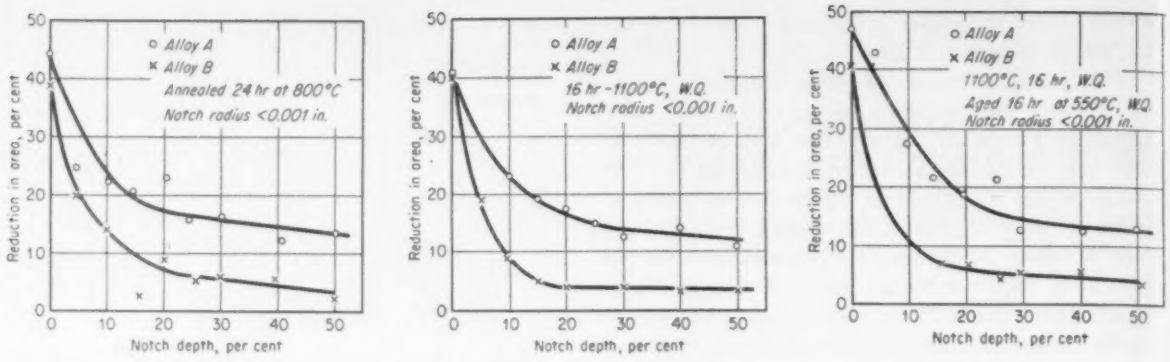


FIG. 5—Notch ductility of titanium-vanadium alloys subjected to varying heat treatments.

Table I

COMPOSITION OF ALLOYS

ALLOY	VANADIUM	CARBON	NITROGEN	MINOR IMPURITIES
A	0.57 pct	0.027 pct	0.05 pct	Fe
B	2.30-2.69 pct	0.212-0.217 pct	0.09 pct	Fe, Al

Table II

PROPERTIES OF TITANIUM ALLOYS In Unnotched Condition

Alloy	Heat Treatment	Tensile Strength, psi	Yield Strength psi	Pct	Fracture Stress, psi	Reduction in Area, Pct	Hardness, RA
A	Annealed 800°C, 24 hours	89,400	70,500	0.2	125,700	44.1	56.3
			68,500	0.1			
			60,800	0.01			
A	Water Quenched from 1100°C	86,400	66,500	0.2	121,100	40.7	58.5
			63,900	0.1			
			48,100	0.01			
A	Water Quenched from 1100°C, Aged 550°C, 16 hours	87,000	61,800	0.2	140,900	47.0	61.7
			55,800	0.1			
			45,400	0.01			
B	Annealed 800°C, 24 hours	131,600	114,600	0.2	188,100	38.8	63.2
			109,000	0.1			
			94,400	0.01			
B	Water Quenched from 1100°C	131,000	107,000	0.2	181,900	39.9	63.9
			98,600	0.1			
			77,400	0.01			
B	Water Quenched from 1100°C, Aged 550°C, 16 hours	132,600	113,300	0.2	195,000	41.5	64.6
			109,300	0.1			
			87,200	0.01			

SOME OTHER CONCLUSIONS

Microstructures obtained by the various heat treatments did not affect notch sensitivity of the alloys.

Notch strength of the alloys tended to increase uniformly with greater notch depth. At very high notch depth, however, decreased ductility in a 2.5 pct vanadium alloy interrupted the continuous increase in strength.

Notch sensitivity of a titanium - vanadium alloy with a strength level of about 88,000 psi, compared very favorably with an aluminum alloy of similar strength.

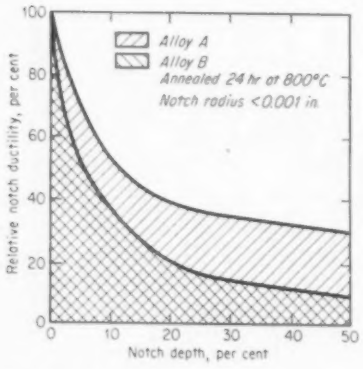


FIG. 6—Comparison of relative notch ductility of annealed titanium-vanadium alloys.

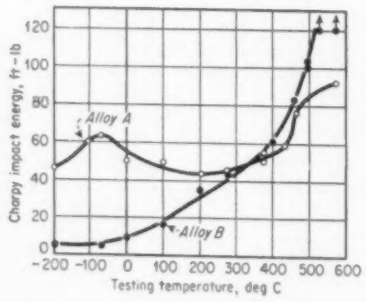


FIG. 7 — Impact transition curve, Alloys A and B, after vacuum annealing 24 hr, 800°C.

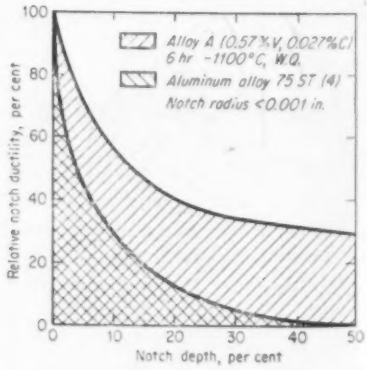

Alloy A (0.57% V, 0.027% C)
6 hr -1100°C, W.Q.
Aluminum alloy 75 ST (4)
Notch radius <0.001 in.
Relative notch ductility, per cent
Notch depth, per cent

FIG. 8—Relative notch ductility for titanium and aluminum alloys of similar strength levels.

were calculated on the basis of the cross-sectional area at the notch before and after testing. Assuming constancy of volume during the test, the tensile strain, dl/l_o, was computed from radial strain measurements at the notch.

It is known that triaxial stresses, such as those induced by notches tend to increase the notch strength* of materials[1]. This is due to the condition of plasticity which requires an increased longitudinal stress to sustain flow with radial and circumferential tensile stresses acting simultaneously.

Flow behavior compared to steel

The flow behavior of the titanium alloys, employing notch tensile behavior as a criterion, was essentially the same as that of steel[2]. The notch strength plotted as a function of notch depth, ** Fig. 3, followed essentially a straight line, the slope of which was such that the ultimate strength of specimens with a notch depth of 50 pct was approximately 1.5 times that of the unnotched specimens. This same relationship had also been found in steels.[2]

A break in the curves (left and right drawings, Fig. 3) occurred between the notch depths of 40 pct and 50 pct. In these cases, increasing notch depth had impaired the ductility of alloy B sufficiently to cause fracture well before the maximum load strain was reached, Fig. 4. No break was observed in the curve of notch strength vs. notch depth for alloy B in the water quenched condition (center drawing, Fig. 3). This was probably due to the fact that this specimen fractured very near the peak of the stress-strain curve, Fig. 4.

Triaxial stresses impair ductility

The ductility is severely impaired by triaxial stresses introduced by notches, Fig. 5. The area under the curve of relative notch ductility† vs. notch depth from 0 to 50 pct was found to be a convenient means of comparing notch sensitivities; that is, the larger the area the lower the notch sensitivity[3]. A comparison of this type between the annealed alloys B and A is given in Fig. 6 which indicated clearly that alloy B had a considerably greater notch sensitivity than alloy A. In line with these results are the standard Charpy V-notch impact data for these two alloys in the annealed condition, Fig. 7.

The notch sensitivities of the titanium alloys studied compare favorably with those for two other structural materials of corresponding strength levels, Table III. Fig. 8 gives a comparison of alloy A with an aluminum alloy (75S) of similar strength level, indicating clearly that the titanium alloy was much less notch sensitive than the aluminum alloy.

Notch ductility data for materials of strength levels corresponding to alloy B could not be found. Stainless steel (AISI 310) of lower strength level than alloy B revealed a lower notch sensitivity than the titanium alloy. Variations in notch ductility as a result of heat treatment were rather small.

Table III

NOTCH SENSITIVITY of Titanium Alloys and of Some Other Structural Materials

Heat Treatment	Tensile Strength, psi	Reduction in Area, Pct	Area Under Notch Ductility Curve*
TITANIUM A			
Annealed at 800°C, 24 hours	89,400	44.1	0.45
Water Quenched from 1100°C	86,400	40.7	0.47
Water Quenched from 1100°C, Aged at 550°C, 16 hours	87,000	47.0	0.44
TITANIUM B			
Annealed at 800°C, 24 hours	131,600	38.8	0.23
Water Quenched from 1100°C	131,000	39.9	0.22
Water Quenched from 1100°C, Aged at 550°C, 16 hours	132,600	41.5	0.19
ALUMINUM, 75S-T[3]			
Solution Heat Treated, Aged	84,500	36.0	0.17
STAINLESS, AISI 310[3]			
Stress Relief at 815°C	102,200	63.3	0.39

* The area under the notch ductility curve (notch depth vs. relative reduction in area at notch) was calculated by normalizing the area between 0 pct and 50 pct notch depth. By this method, a material which retains its reduction in area in the unnotched state up to a notch depth of 50 pct would show an area of unity.

---

* NOTCH STRENGTH:

$$\frac{\text{Maximum load in a notched test}}{\text{Original cross section area at notch bottom}}$$

† RELATIVE NOTCH DUCTILITY:

$$\frac{\text{Percent reduction in area of notched specimen}}{\text{Percent reduction in area of unnotched specimen}}$$

** NOTCH DEPTH:

$$\frac{\text{(area of unnotched cylindrical section)} - \text{(area at notch bottom)}}{\text{(area of unnotched cylindrical section)}}$$

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ACKNOWLEDGMENTS

This study was made under contract with Army Ordnance Corps, Watertown Arsenal. The authors thank the Ordnance Corps for permission to publish this research, and are grateful for the cooperation of Watertown Arsenal Laboratory in preparation of material.

Slows the action—

High Speed Photography Detects Machinery Problems

◆ Faulty machine operations that are too fast for the eye to study can often be photographed with high speed movie cameras . . . Projecting these films at normal speed slows the machine action for analysis and corrective measures . . . Trouble shooting with this technique is proving to be better and cheaper than trial-and-error guesswork.

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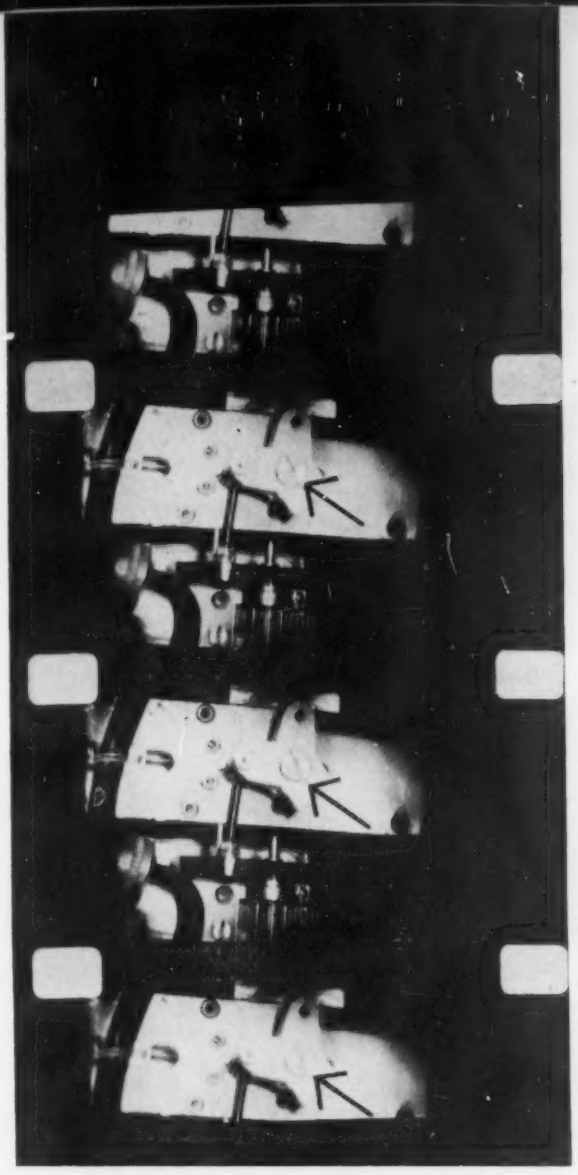
HANDY cabinet on wheels houses high speed motion picture camera and auxiliary equipment.



FILMSTRIP shows assembly machine out of cycle. Slot in screw should be in vertical position.

◆ HIGH SPEED MOVIE cameras are quick to spot the causes of process, assembly and product performance troubles at Rochester Products Div., General Motors Corp. Manufacturing operations at the plant are varied, and a large amount of special machinery is designed and built by the company's engineers. High speed photography has been used several times to advantage on such equipment. As a result, tool breakage, excess downtime and general sub-par performance in several critical areas have already been greatly reduced.

Slowdown ratio may be 500:1

Many of these machine operations occur so rapidly that they are merely a blur to the human eye. They can give the illusion of perfect performance, even when results are far from satisfactory. But when machine action is photographed at high speed and slowed down as much as 500 to 1 by conventional projection, engineers can frequently detect the cause of trouble in short order.

High-speed movies permit viewing, over a period of several minutes, a machine operation that actually takes only a split second. Speeds up to 8,000 frames per second are possible with the equipment used, and a 100-foot film roll may be exposed in approximately 0.6 seconds.

One production problem solved by high speed photography occurred in a rotary swager which sizes steel tubing for brazing. The swager required extensive tool attention and machine repair, but the cause of the trouble was not clear. Engineers suspected that it was in a certain rotating part, but the 700 to 800 rpm speed was too fast for the eye to follow.

Engineers installed a cut-out plate on the face of the machine to expose the part for the high speed camera. The action was shot at 5,000 frames per second and projected at a normal 16 frames per second. Actual 700 to 800 rpm part speed became less than 5 rpm on the screen and the trouble was immediately spotted.

Detects big tolerance error

In this rotating part two hammer blocks are free to slide up and down. When the swager is at rest, the blocks have a 0.004 in. tolerance fit in their guides. High speed photos showed that this close fit was opening up to about 3/32 in. to cause undesirable side play and loss of force. The movies also showed that the hammer blocks were not returning to a full outside position after they passed each of the swager's impact rolls. This indicated additional loss of force.

Armed with this information, company engineers are working to make the indicated corrections in the hammer mechanism.

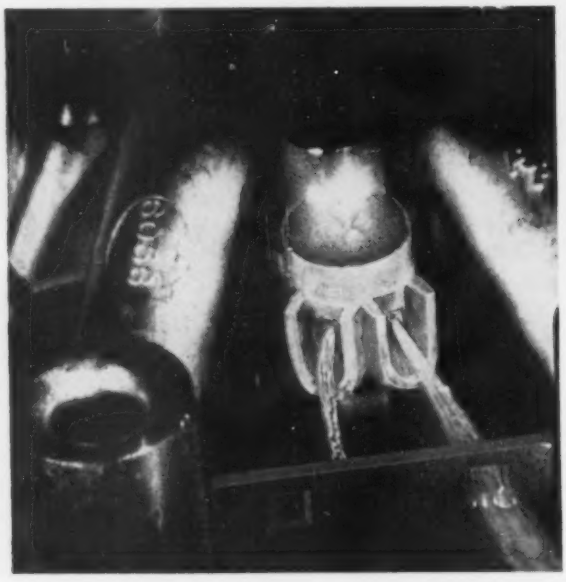
In another case, a stream of fluid through a carburetor section was deflecting from the desired path. It was thought that the deviation might be caused by spiraling of the stream, but a highspeed film study disproved this theory. Instead, the pictures showed that a section of material near the orifice was attracting and deflecting the fluid. Slight changes in location and angle of the orifice corrected this condition.

High speed photography can also prove helpful in working out new development "bugs." In one such instance, an automatic assembly machine with a series of short-cycle sequences developed unexpected trouble.

The overall machine cycle was approximately two seconds. At one station the sequence was out of time and causing a jam-up. High speed pictures showed why: An assembly stroke was starting before the part was fully loaded into the receiver. Minor sequence adjustments promptly corrected this condition.

The high speed camera technique was applied to another trouble spot where, following a contiuuous copper-plating process, lengths of tubing are cut into close-tolerance segments. To prevent tubing from stalling behind the blade of the cut-off die at the instant of cutting, the die travels

MOVIE of troublesome swaging operation shows excessive gap between hammer block and guide.



FRAME from high speed film shows faulty fluid stream at left, points way to proper remedy.

a short distance with the tubing before returning to its original position.

On one production line the tubing did stall, despite the die travel. This created an overload that opened circuit breakers and shut down the whole process. Preliminary investigation pointed to a lengthening of the die travel as a corrective but expensive and time-consuming alteration.

Before this extreme measure was decided upon, a high speed movie was made of the cutoff cycle. This showed clearly that the trouble was not necessarily in the length of the die travel.

Engineers could see in the slow-motion pictures that the cutoff blade descent and return was not as smoothly instantaneous as it appeared under normal observation. Actually the blade was shown to descend rapidly at the start of the cycle, hesitate as it penetrated the tubing wall, and stop at the bottom of the down stroke for a comparatively long time. On the upstroke, the blade acted normally until the last half inch of travel, when it slowed perceptibly. At this point the hydraulic cutoff cylinder piston was entering the cushion zone, accounting for the reduced speed.

The cylinder design and hydraulic circuit are being revised to reduce this cycle lag, rather than attempting the expensive lengthening of the die travel.

To show capabilities of the high speed camera in slowing down rapid action, two other film studies were made. One was on a 60-cycle, continuous tube-welding process; the other on a double action cold-heading machine operating at 170 strokes per minute.

Purpose of the first study was to analyze the cycling action of alternating current. At 5,000 film frames per second, the stitching action of a.c. welding showed clearly. Positive and negative arc action was also evident.

The cold-heading process was shot at 3,000 frames per second. Normal speed projection slowed the action to show only seven header strokes during a four-minute screening period.

Action area must be visible

Subjects for high speed movie analysis are usually limited to areas of visible action except in cases like the rotary swager study, where cutout sections or clear plastic plates will expose otherwise hidden action.

The 16 mm camera used by Rochester Products is a continuous-drive, rotating-prism type. The prism optically "wipes" the image on and off the film strip, and rotates at the same speed as that of the film. Thus, the extreme speed of the film is constant, and the intermittent action of conventional motion picture cameras is eliminated.

High speeds in all cameras of this type are attained by overvolting the drive motor to get maximum velocity as rapidly as possible. In the short time required to expose 100 ft of film, this overvolting is not critical. A special speed control unit incorporates a variable voltage regulator, timers, synchronizer, and a means of remote control.

An auxiliary kit for the firm's camera contains an assortment of lenses and extension tubes for wide-angle, close-up, or long distance work.

AIRCRAFT-QUALITY ALLOY STEELS by Newport Steel

Manufacturers and subcontractors find Newport Steel a most dependable and economical source for highest quality aircraft alloy steel in plate, sheet and strip, including the popular chrome-molybdenum AISI 4130. Long famous for clean, sound, chemically accurate alloys, Newport today supplies ever-increasing tonnage for planes, guided missiles, Jato rockets and other vital defense products. All made on modern facilities, to exact specifications of government and manufacturer. From the heart of America's fastest-growing industrial area, Newport offers highest quality and prompt delivery. Let us tell you more!

PRODUCTS OF NEWPORT STEEL

- Hot-Rolled Steel in Coil
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- Electric Weld Line Pipe
- Hot-Rolled Sheets
- Galvanized Sheets
- Galvannealed Sheets
- Colorbond Sheets
- Hot-Rolled Pickled Sheets
- Electrical Sheets
- Alloy Sheets and Plates
- Roofing and Siding
- Eave Trough and Conductor Pipe
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Low-carbon cold-rolled steel sheets will soon be available from our new cold mill.

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FREE AIDS

New Technical Literature

Catalogues and Bulletins

Operating practices

Good operating practices are the subject of this new booklet. The booklet contains suggestions for maintaining plant buildings and equipment. It contains the latest recommendations for getting the best service out of insulations, packings, refractory products, roofings and friction materials. *Johns-Manville.*

For free copy circle No. 1 on postcard, p. 65.

Cargotainers

"Duty Designed Cargotainers" are covered in this new brochure. The booklet gives technical details on these exclusive welded steel wire mesh containers and the advantages they offer in materials handling. Case history examples of cost reduction are included. Also included is information on the application of welded wire pallets and industrial bulkheads. *Pittsburgh Steel Products Co.*

For free copy circle No. 2 on postcard, p. 65.

Products

The range of fluid power cylinders, valves and packaged devices in the Modernair line is described in this new brochure. The company's facilities and achievements are covered. Typical applications of Modernair products are described. *Modernair Corp.*

For free copy circle No. 3 on postcard, p. 65.

FOR YOUR COPY

Money-saving products and services are described in the literature briefed here. For your copy just circle the number on the free postcard, page 65.

Engraver

The Green Model D-2 heavy-duty pantograph engraver is described in this new brochure. The new engraver is open on three sides and equipped with a single vertical adjustment for both spindle and copy table. The brochure tells all about the design which enables the engraver to mill, profile and engrave large panels and bulky work pieces. *Green Instrument Co.*

For free copy circle No. 4 on postcard, p. 65.

Vise

The Emmert "Uni-Machinist" Vise is covered in this new leaflet. The vise is shown and its advantages are listed. Among uses suggested are in body shops, aircraft shops, model shops, or for plumbers and metal pattern-makers. Sizes are given. *Emmert Mfg. Co.*

For free copy circle No. 5 on postcard, p. 65.

Bolts

High strength structural bolts are covered in this new booklet. The booklet gives the advantages of these bolts. It includes the complete ASTM Specification A-325 needed for the assembly of structural joints, as well as the necessary information needed to order these bolts. *Republic Steel Corp.*

For free copy circle No. 6 on postcard, p. 65.

Turn Page

"I sure love to watch this fellow work — with those BUSTER ALLOY tools!"

COLUMBIA TOOL STEEL COMPANY • CHICAGO HEIGHTS, ILL.

Producers of fine tool steels — All types immediately available through Sales Offices, Warehouses and Representatives in Principal Cities.

TOOL COLUMBIA STEELS

Nowhere - no, nowhere — can you find a greater selection of non-ferrous tubing in small diameters and thin walls

Produced in sizes from .032" O.D. to ¾" O.D. and wall thicknesses from .005" to .095"

Do your small-tube requirements call for seamless drawn tubes in long coils, on reels, in short lengths?

Do you need thin-wall tubes, capillary tubes, restrictor tubes, Bourdon tubes, special shapes, fabricated tube parts or tubes for refrigeration and air-conditioning work?

Are you looking for a varied choice of small-tube alloys, such as: phosphorized and OFHC copper, yellow and low brasses, leaded brasses, nickel silvers, phosphor bronzes, naval brass, Admiralty, trumpet brass, Everdur*, commercial bronze and aluminum?

Only Anaconda offers you this complete selection of small-tube types, sizes and alloys. As usual, you can count on Anaconda to take special care to see that inside surfaces of all tubes are clean, smooth and bright, and that all tubes are accurate in size and shape.

For quick action, call our nearest District Sales Office, or write to: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

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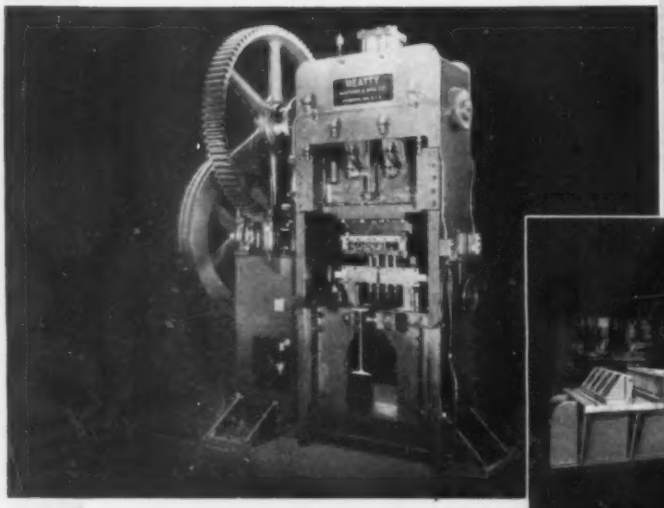
A FEW OF THE MANY sizes and shapes of Anaconda Small-Diameter Tubes

ANACONDA®

SMALL-DIAMETER TUBES

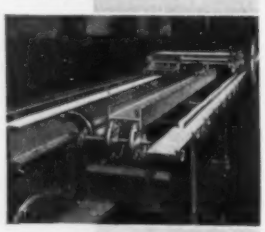
Beatty Beam Punch has
ADJUSTABLE TOOLS
–punches flanges in "I" and WF beams!



BEATTY Horizontal Hydraulic Bulldozer for heavy forming, flanging and bending.

Here's a new versatile Beatty machine that is ideal for the structural steel fabricator who runs a miscellaneous job shop and requires frequent set-up changes. The new guillotine beam punch, with 200 ton capacity, features built-in adjustable tools for flange punching "I" and Wide Flange beams. A turn of a handwheel provides quick change of punching centers and synchronizes punch with die at the same time. These tools consist of two frames which open and close about the center line of the beam. It has four punching units; minimum inside setting is 2¼", maximum 6¾". Centers between inside and outside punches can be adjusted from 2¼" to 3½". For specific details on improving metal fabricating production—consult your Beatty engineer!

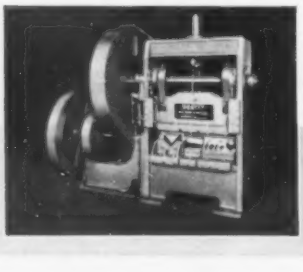
BEATTY Guillotine Beam Punch. Punches webs and flanges in "I" beams from 6 to 30 inches.



BEATTY Spacing Table handles web and flange punching without roll adjustments.

BEATTY
MACHINE & MFG. COMPANY
HAMMOND, INDIANA

BEATTY Gap Type Press for forming, bending, flanging, pressing. Capacity 250 tons.



BEATTY Guillotine Bar Shear for angles, bars, rounds, squares without changing tools.

Sheaves

Improved carbon and alloy cast steel sheaves are covered in this new folder. The folder also contains information regarding its complete wire rope fittings and accessories catalog No. 22. *Farrell-Cheek Steel Co.*

For free copy circle No. 7 on postcard, p. 65.

Reamers

Precision-ground reamers are the subject of this new catalog. Among the types covered are the hand reamers, shell, expansion, taper pin, stub, chucking, decimal and dowel pin reamers. A selection of shell reamer arbors is also shown. Specifications are given in chart form. *DoAll Co.*

For free copy circle No. 8 on postcard, p. 65.

Tool grinding

Tool grinding is the topic of this new bulletin. The New Bay State Diamond Wheels are featured. Among advantages stressed are economy, top quality performance, endurance and efficiency. Specifications are included. *Bay State Abrasive Products Co.*

For free copy circle No. 9 on postcard, p. 65.

Recording-controller

The Thermo Electronic recording-controller is featured in this new bulletin. Potentiometer pyrometer and resistance thermometer controllers with either two-position or pulse-proportional control action are described. *Thermo Electric Co., Inc.*

For free copy circle No. 10 on postcard, p. 65.

Weighing meters

Continuous weighing meters are the topic of this bulletin. The Massometer, designed for flow-rate measurements of free-flowing solids, and Merchen Scale Meter, which provides continuous belt weighing of solids, are covered. These Wallace and Tiernan pneumatic balance meters are used with Brown recorders and controllers to provide fast, accurate and continuous handling of bulk materials, according to the bulletin. *Minneapolis-Honeywell Regulator Co.*

For free copy circle No. 11 on postcard, p. 65.

Turn Page

at Hill-Trumbull Plant

Customer's Performance Record

EQUIPMENT: Two 72" x 192" single deck Hewitt-Robins Dewaterizers with dewatering decks and dams.

LOCATION: Cleveland-Cliffs Iron Company, Hill-Trumbull Plant, Calumet, Minnesota.

OPERATION: Removal of water and slimes from heavy-media D.S.M. Cyclone Plant feed to prevent dilution and contamination of magnetite media.

PERFORMANCE: 125 long tons per hour of iron ore, minus 8 mesh classifier sands, dewatered from approximately *20% moisture* to *12% moisture*. A substantial portion of the minus 65 mesh material which is unrecoverable in the Cyclone Plant is removed from the feed at the same time.

RESULTS: Because of the outstanding service given by these two Hewitt-Robins Dewaterizers, the Cleveland-Cliffs Iron Company purchased two more identical units for their Hawkins Plant at Nashwauk, Minnesota.

ENGINEERING DATA

SIZES: From 3′ x 12′ to 6′ x 16′.

DESKS: Patented construction—triangular stainless steel rods—size of openings, ¼ mm and up.

MOUNTINGS: Either floor or suspension mounting—can be operated horizontally or slightly inclined or declined.

DRIVE MECHANISM: Motor, V-belt drive and vibrator assembly readily accessible for easy maintenance.

INSTALLATION: So simple that it can be handled by your own personnel.

Here is a partial list of

HEWITT-ROBINS PRODUCTS

that will help you cut handling costs and increase operating efficiency.

MACHINERY

Belt Conveyors
Belt & Bucket Elevators
Car Shakeouts
Conveyor Idlers
Dewaterizers
Mechanical Feeders
Foundry Shakeouts
Mine Conveyors
Reclaiming Systems
Screen Cloth
Stackers & Trippers
Vibrating Conveyors & Screens

INDUSTRIAL RUBBER PRODUCTS

BELTING:

Conveyor
Elevator
Transmission

HOSE:

Acid
Air & Air Drill
Barge Loading
Dust Suction
Fire
Fuel Oil & Gasoline
Gasoline Pump
Mud Pump Suction
Oil Suction & Discharge
Propane-Butane
Road Builders'
Rotary Drilling
Sand Blast
Sand Suction
Sea Loading
Servall®, All-Service
Steam
Tank Car & Tank Truck
Vacuum & Air Brake
Water & Water Suction
Welding, Twin-Weld®

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For information and service on industrial rubber products, contact your Hewitt-Robins Industrial Supply Distributor. Through his complete stock of Hewitt-Robins Rubber Products, and his familiarity with local field conditions, he can fill your supply needs promptly and correctly. See Classified Phone Book for the Hewitt-Robins Industrial Supply Distributor serving your area.

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STRUCTURAL STEEL FABRICATORS

POLLASKY AUTOMATIC SPACERS insure huge savings in the fabrication of steel and will cut your costs of punching holes in iron. Rapid punching using only ONE OPERATOR. The spacing bars used can be rapidly set and eliminate all templet making and marking of iron. These Spacers operate on forward and return travel allowing angle iron to be punched in both legs at one handling. Simple to operate. These Spacers can be designed to operate with your present punch in any size to handle your range and length of work.

STEEL STAMPING PLANTS

Set up with a blanking press this AUTOMATIC SPACER will feed any size or length of plate. A series of blanks can be cut on the forward travel and a new series of blanks cut on the return travel. Can also be used with a shear or saw for cutting off operations. Full automatic operation. Consult us for special applications.

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3802 N. 38TH STREET
MILWAUKEE 16, WIS.

MACHINERY: Unit Redesigned

Boring-drilling-milling machine offers advantages of greater accuracy, plus plenty of speed and power . . . Interlocks safeguard machine and operator.

For the second time in as many months, The Bullard Co., Bridgeport, Conn., announces a complete redesign of another of its major machine tool lines.

Product of the latest change is the firm's entirely new horizontal boring, milling and drilling machine. It is designated as the Model 75 in honor of the company's 75th anniversary, and is built to match present and future demands for speed, accuracy and power.

Built in 3, 4 and 5 in. spindle sizes, this table-type machine has many new features and advantages not heretofore available in machines of this type. Most prominent is the simplified single pendant control station which allows the operator to quickly select all operational machine functions. It can be raised or lowered by power and swiveled manually in a 180° arc for complete machine control from a movable vantage point.

Mechanical Interlocks Used

Mechanical interlocks are provided to prevent engagement of opposing pendant control levers, thus safeguarding both machine and operator. Rotary feed and speed rate selector dials on the Pendant are the direct reading type. And a directional switch provides change of spindle rotation for tapping or threading.

The new machine has a hydraulic shifter unit which actuates all speed and feed clutches. Hydraulic pressure and return lines are drilled in the pressure plate, to eliminate pipe and fittings.

Massive Ribbed Bed

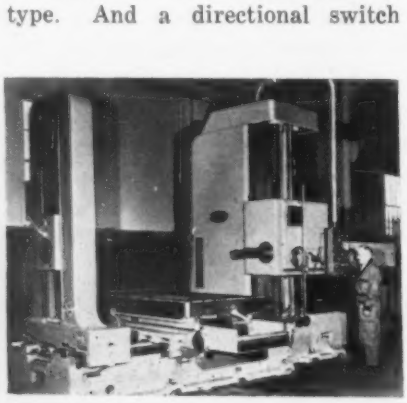
There are 32 available feeds for each spindle speed. All gear and clutch shafts rotate on anti-friction bearings and a safety overload clutch in the feed works protects the feed mechanism. Commercial threads—8, 12, 16, 24, and 32 per inch—can be cut with the standard feed works.

The massive 4-way bed is heavily ribbed for rigid support of the table and saddle. Each way is a replaceable chrome-hardened bearing surface. Extra strength is also built into the heavy duty headpost for maximum rigidity and minimum vibration.

Hydraulic Counterbalance

The head spindle has 42 in. of screw feed on the 4 and 5-inch machines and 28 inches on the 3-inch machines. A rack and pinion mechanism in the head provides 7½ inches of rack feed on the 4 and 5 in. machines and 5 inches on the 3-in. machines.

An adjustable hydraulic counterbalance assures smooth head operation. Gears, bearings and shafts are gravity drip lubricated with



Power and accuracy . . .

WANT MORE DATA?

You may secure additional information on any item briefed in this section by using the reply card on page 65. Just indicate the page on which it appears. Be sure to note exactly the information wanted.

filtered oil pumped from the bed reservoir. All sliding surfaces on the machines are lubricated by one-shot pumps.

Electrical controls are readily accessible in a head post compartment yet completely concealed and protected from oil, dust and other foreign matter. A wide range of extra equipment is available to meet customer requirements.

Testing:

Abrasion tester gives fast accurate results.

A new abrasion tester for testing and measuring the abrasion resistance of porcelain enamel and other finishes and materials has been developed. The instrument was developed under the guidance of the P.E.I.'s Quality Development Committee by the Institute's Research Fellowship at the National Bureau of Standards.

The abrasion tester is valuable in both control and research. While the tester has been used principally for testing porcelain enameled metal specimens it has drawn the interest of manufacturers in other fields.

Can Test Many Materials

Evaluating the durability of highway paints, testing the serviceability of plastic and fibrous materials, testing the wear resistance of organic finishes, and comparing the abrasiveness of household cleaners are possible applications.

The compact unit consists of a motor-driven table which gyrates in a horizontal plane at a frequency of 300 rpm. Each point on the table describes a circle ⅞ in. in diam. The table is driven by a ¼ hp synchronous motor; the time of test is accurately controlled by an electric timer. The table of the tester is made from selected canvas-base thermosetting plastics.

A specimen is placed in any one (or more) of the nine available positions and secured by means of a rubber-coated aluminum retaining ring. The abrasive charge is added through a hole in the top of the retaining ring.

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is the sign of telephone service . . .
And smart gear users know
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the best in custom made gears.

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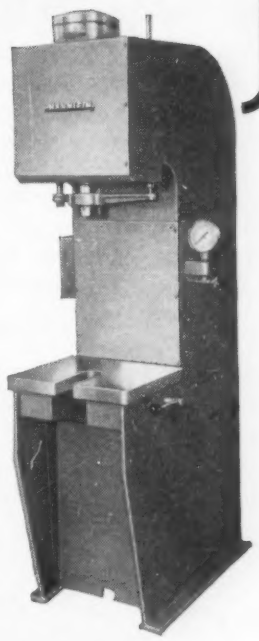
PRICE LIST

ON HANNIFIN STOCK HYDRAULIC PRESSES



1-TON	$ 552
2-TON	$ 627
5-TON	$1,286
8-TON	$1,581
10-TON	$1,855
25-TON	$3,681

Prices complete with motors and starters F.O.B. our press plant, St. Marys, Ohio, subject to change without notice.

DELIVERY FROM STOCK

Demand for these popular presses is so consistent we are able to produce them in quantity and pass the savings along to you.

Construction-wise and quality-wise these small general-purpose presses are identical to the larger Hannifin presses, up to 150 tons. Special, optional controls when needed.

WRITE for complete information on the Hannifin Hydraulic Press you're interested in.

HANNIFIN

HANNIFIN CORPORATION, 513 S. WOLF ROAD, DES PLAINES, ILLINOIS

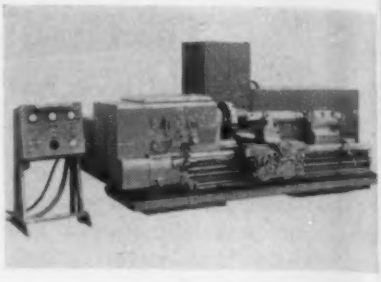
NEW EQUIPMENT

New and improved production ideas, equipment, services and methods described here offer production economies . . . for more data use the free postcard on page 65 or 66

New lathe shows 118 hp consumed at the cut

A 32-in. heavy duty engine lathe is equipped with a 125 hp motor for high-power turning. Tests of the machine are said to show 118 hp consumed at the cut. Condensed specifications of the new lathe include: 125 hp, 2-speed dc motor; infinitely-variable speeds from 42 to 1400 rpm; 56 feeds from 0.002 to 0.250 ipr. Standard features include 4-directional power rapid traverse built into apron; one-piece apron and hardened rack; totally-enclosed quick-change box. *R. K. LeBlond Machine Tool Co.*

For more data circle No. 25 on postcard, p. 65.



Platform truck handles dies by remote control

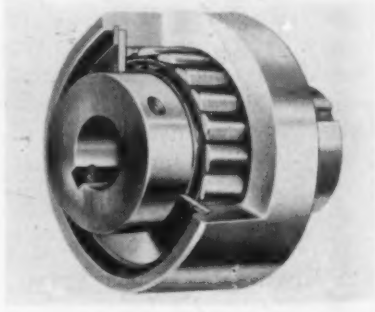
Handling of dies weighing as much as 40,000 lb by remote control is a feature of this electric highlift platform die handling truck. A remote control pushbutton unit with a long cable hangs at the side of the operator's compartment. This makes possible the loading or unloading, positioning and lowering or lifting of dies by the operator from any position around the truck. Die handling platform is 84 in. long x 64 in. wide. Maximum raised height is 75 in. from the floor. Power is supplied by a gas electric motor generator. *Yale & Towne Mfg. Co.*

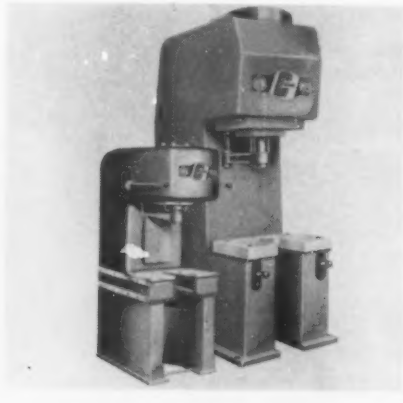
For more data circle No. 26 on postcard, p. 65.

Cam clutches for low-speed, low torque ranges

A new line of low-cost, plain bearing cam clutches are basically designed for operation in the lower speed and torque ranges. They can be used in conjunction with standard shafting on press feeds, two-speed drives and as backstop and overrunning clutches in machine drives. These self-contained units include long bronze bearing, hardened and ground steel inner and outer races, a full complement cam and energizing spring assembly, a snap ring, and a grease fitting for lubrication. The clutches are prelubricated at the factory. *Morse Chain Co.*

For more data circle No. 27 on postcard, p. 65.





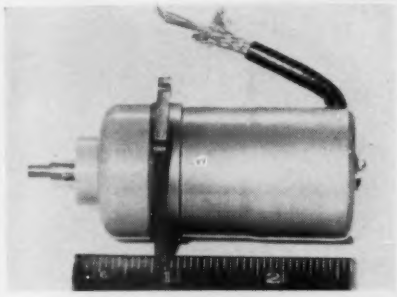
New press line features 11 sizes to 200 tons

Oil hydraulic C-frame presses ranging in size up to 200 tons are designed for low tonnage jobs. For each model is offered a choice of control valve assemblies. Operating controls include single or dual safety operating levers, electric pushbuttons, foot switch, foot pedal and other standard types. A high speed differential circuit and inching control allows the press operator to literally inch the ram downward or upward while setting dies. Open C-gap frame eliminates encumbrances within the tooling area and provides a maximum amount of room for tooling. The 60-sec ram stroke adjustment is located away from the tooling area. Self-contained frame design features compact power units which can be easily removed. *Hydraulic Press Mfg. Co.*

For more data circle No. 28 on postcard, p. 65.

Miniature motor

New miniature permanent magnet motor when equipped with a new type gear train that reduces as high as 1600 to 1, can replace motors several times its size, it is reported. The motor operates with a smaller air gap than is customary without any deterioration of commutation and without increasing

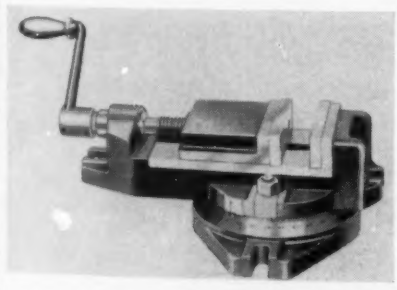


the loss in field shoes, due to specially shaped and laminated field shoes. Longer life and better motor performance is assured by use of mica insulated commutators. The motor is available in six different models with or without gear reduction units. It weighs 3¾ oz; is 2 in. overall length. *Airquipment Co. Inc.*

For more data circle No. 29 on postcard, p. 65.

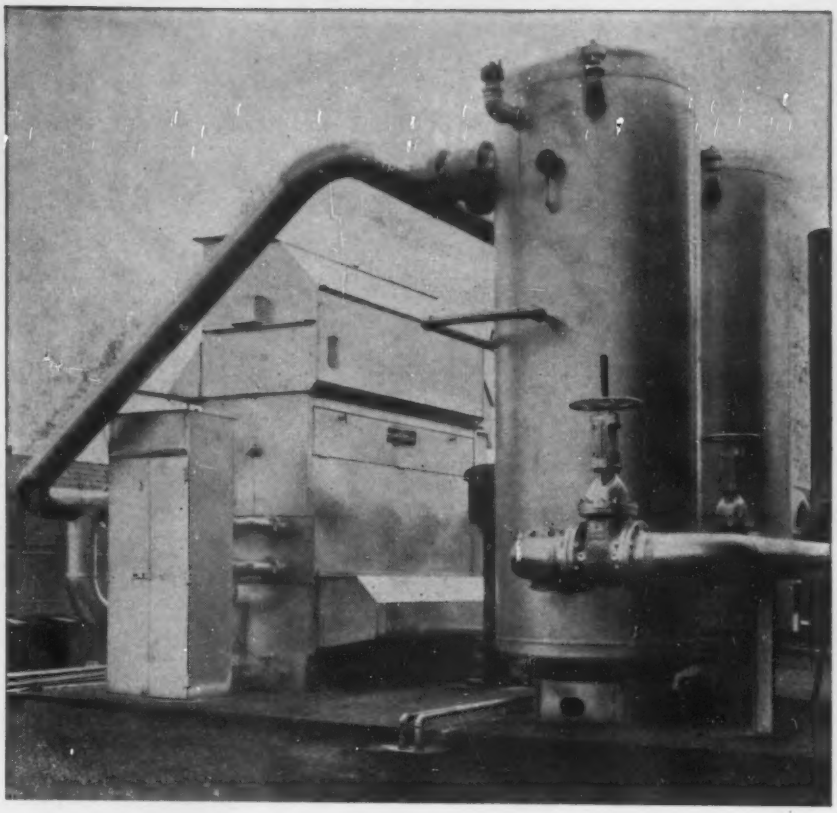
Swivel vise

New screw swivel vise for milling machines, shapers and drill presses are rugged in construction, precise in design. Covers prevent chips from falling into swivel slides. Jaws are hardened and ground.



Semi-steel castings throughout to materially increase vise strength, make body practically indestructible. Other features include a graduated swivel base; keyways in body and swivel base permitting use with or without base. *Nelco Tool Co.*

For more data circle No. 30 on postcard, p. 65.



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Getting Drier Compressed Air

● Direct saving in the cost of cooling water saves the price of the Niagara Aero After Cooler (for compressed air or gas) in less than two years.

Extra, for no cost, the drier air gives you a better operation and lower costs in the use of all air-operated tools and machines, paint spraying, sand blasting or moisture-free air cleaning. Water saving also means less expense for piping, pumping, water treatment and water disposal, or you get the use of water elsewhere in your plant where it may be badly needed.

Niagara Aero After Cooler assures all these benefits because it cools compressed air or gas below the temperature of the surrounding atmosphere; there can be no further condensation in your air lines. It condenses the moisture by passing the air thru a coil on the surface of which water is evaporated, transferring the heat to the atmosphere. It is installed outdoors, protected from freezing in winter by the Niagara Balanced Wet Bulb Control.

Write for complete information; ask for Bulletin No. 98

NIAGARA BLOWER COMPANY

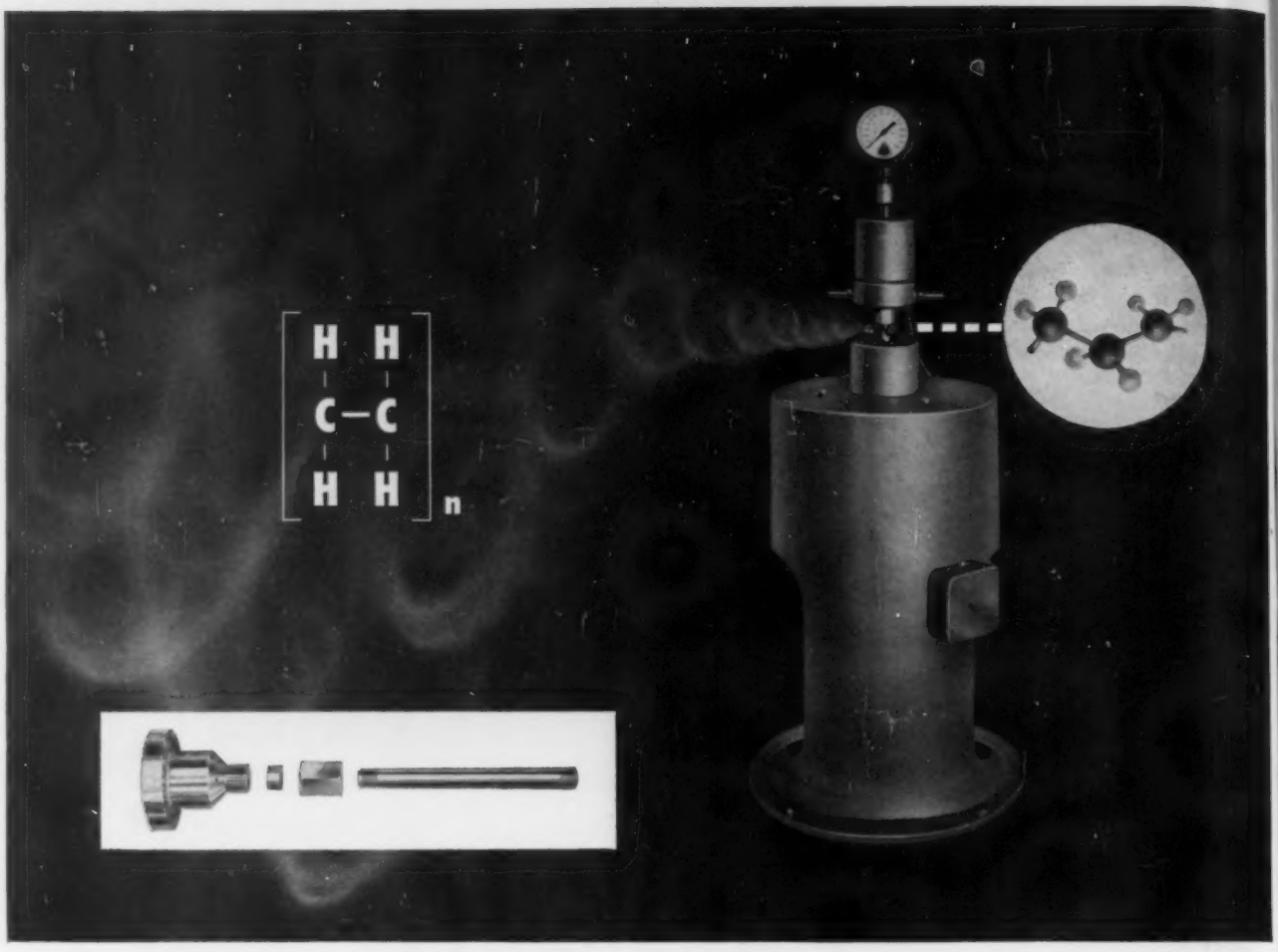
Dept. IA 405 Lexington Ave. New York 17, N. Y.

Niagara District Engineers in Principal Cities of U. S. and Canada

INDUSTRIAL COOLING HEATING • DRYING

NIAGARA

HUMIDIFYING • AIR ENGINEERING EQUIPMENT



TUBING BY SUPERIOR SAVES 33% on production cost of Autoclave covers!

Shown here is the Magne Dash* autoclave, a "dash pot" used to test physical and chemical properties of materials under high pressures.

The Magne Dash cover now costs far less to make than it used to. For in redesigning it, Autoclave Engineers, Inc., Erie, Pa. found that Superior cold drawn Type 316 stainless steel tubular component gave them amazing economies. Savings 33%.

Originally, 2" stainless steel forgings were used in the Magne Dash cover. These had to be machined and deep drilled—time-and-money consuming operations. Superior tubing eliminated this expensive work and reduced scrap loss almost to zero! At the same time, minimum yield strength was raised from about 40,000 psi to 100,000 psi. And Autoclave Engineers found Superior tubing easy to thread, easy to clean and unusually resistant to corrosive catalysts used in testing.

If you have a problem in high pressure processing—or any other problem that involves tubing—call on Superior. We make a specialty of fine tubing—in special shapes and sizes—and in more than 55 analyses! Out of our long experience, you are sure to get the answers you want. Tell us about your current production problem. Send for our free Catalog Section 20 on stainless steel tubing. Superior Tube Company, 2004 Germantown Ave., Norristown, Pennsylvania.

*Licensed by Standard Oil Company (Indiana) U.S. Patents 2631091 and 2661938

Round and shaped tubing available in Carbon, Alloy and Stainless Steels; Nickel and Nickel Alloys; Beryllium Copper; Titanium; Zirconium

Superior Tube

The big name in small tubing

All analyses .010" to ⅜" O.D.
Certain analyses in light walls up to 2½" O.D.

West Coast: Pacific Tube Company, 5710 Smithway St., Los Angeles 22, Calif. • RAymond 3-1331

The Iron Age SUMMARY. . .

Ingot rate advances 3.5 points to 77.5 despite holiday . . . Mills paying double time . . . Expect more gains in first quarter.

Production . . . Despite another contract holiday this week, steel production is scheduled to move up 3.5 points to 77.5 pct of rated capacity. Mills are paying double time to get out more metal.

After the holiday the ingot rate is expected to move above 80 pct of capacity again. Steel output in the first quarter of 1955 is expected to exceed any quarter of 1954. Much of the business is already in the bag. And auto producers will put on even greater pressure as they speed production to hedge against a possible strike.

Reds Gain . . . A special study of world steel production just completed by THE IRON AGE shows that Iron Curtain countries in 1954 again registered impressive gains—while production of the Free World declined. As a result, the Free World's 4 to 1 advantage in steel output has been narrowed to 3 to 1.

Total world steel production in 1954 declined 5.2 pct from the 1953 record, largely because of a 20.8 pct decline in United States output. World output in 1954 was 245,190,000 net tons, compared with 258,706,000 tons in 1953.

Spearheaded by Russia, countries in the Soviet bloc produced 7.7 pct more steel in 1954 than they did in 1953. Production in countries of the Free World fell 9.0 pct short of the record established in 1953.

Combined production of Russia and her satellites was 62,825,000 net tons in 1954, compared with 56,337,000 tons in 1953. Output in the Free World countries was 182,365,000 tons in 1954, compared with 200,369,000 tons the previous year.

Although U. S. production declined 20.8 pct in 1954 while Russian output gained 7.4 pct, the U. S. still produced about twice as much steel as the Russians. (Prior to 1952 the U. S. advantage over Russia was better than 3 to 1.) U. S. output in 1954 amounted to 88.3 million tons, compared with 111.6 million tons the previous year. Russia produced 44.9 million tons in 1954, compared with 41.8 million tons in 1953.

All but two of the 27 countries listed in THE IRON AGE study of world steel production showed gains in 1954 over the previous year. In addition to the U. S., the only country showing a decline was Canada, which slipped 24.1 pct.

Russia dominated steel production behind The Iron Curtain far more than the U. S. did Free World output. The Russians poured 71.5 pct of steel made by the Communist bloc, while the U. S. produced only 48.4 pct of Free World steel.

Steel Output, Operating Rates

Production	This Week†	Last Week	Month Ago	Year Ago
(Net tons 000 omitted)	1,846	1,726	1,941	1,706
Ingot Index (1947—49=100)	114.9	107.4	120.8	106.2
Operating Rates				
Chicago	81.0	83.0	90.0	88.0
Pittsburgh	74.0	70.0*	78.0	75.0
Philadelphia	65.0	65.0	71.0	70.0
Valley	68.0	69.0*	79.0	58.0
West	78.5	62.0*	79.5	76.5
Detroit	91.0	84.0	83.0	82.0
Buffalo	100.0	100.0	97.5	52.0
Cleveland	84.0	91.0*	84.0	51.0
Birmingham	62.5	67.0	64.0	80.5
S. Ohio River	86.0	90.0	85.0	80.0
Wheeling	85.0	67.0*	96.0	73.0
St. Loius	74.5	63.0	83.0	83.0
Northeast	46.0	56.5*	64.0	67.0
Aggregate	77.5	74.0	81.0	74.0

*Revised. †Tentative

Prices At A Glance

(cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
Composite prices				
Finished Steel, base	4.797	4.797	4.797	4.634
Pig Iron (gross ton)	$56.59	$56.59	$56.59	$56.59
Scrap, No. 1 hvy (gross ton)	$32.83	$32.83	$32.33	$30.17
Nonferrous				
Aluminum, ingot	22.20	22.20	22.20	21.50
Copper, electrolytic	30.00	30.00	30.00	29.75
Lead, St. Louis	14.80	14.80	14.80	13.30
Magnesium, ingot	27.75	27.75	27.75	27.00
Nickel, electrolytic	67.67	67.67	67.67	63.08
Tin, Straits, N. Y.	87.25	85.625	89.875	84.50
Zinc, E. St. Louis	11.50	11.50	11.50	10.00

Automakers Will Pour It On

Strike possibility next summer may be a powerful factor in sheet, bar consumption . . . See automakers running at capacity regardless of first half sales rates.

◆ UNCERTAIN labor outlook in Detroit may have a strong effect on automobile production during first five months of 1955—and that would mean a continuing strong demand for sheets and other steel products that go into the making of cars.

A growing feeling in Detroit and elsewhere is that the car makers will hold production at high levels regardless of sales through May of the New Year as a hedge against the possibility of a strike by the CIO United Automobile Workers.

Walter Reuther, UAW president, has been using strong language with regard to his union's plans to demand the guaranteed annual wage and other concessions upon the expiration of 5-year contracts.

It is felt that regardless of whether or not a strike materializes, the net result of overproduction during the early months of 1955 will have a depressing effect on steel later in the year. If new contracts are negotiated peaceably, the auto producers are likely to taper off production and let sales catch up with inventories. If there is a strike, of course, at least some of the automotive production lines will go down for an indefinite period.

The market continues to boom in light, flat-rolled products—sheets, strip, galvanized, enameling sheets, and silicon sheets. Even stainless has taken on amazing strength in some producing centers. Other products are not so strong, although some are improving and others have taken on a better outlook.

Sheffield Steel Corp. Div. of Armco announced price reductions on some products effective Dec. 22. New prices include HR carbon bars $4.55; HR alloy bars $5.325; HR carbon structural shapes $4.30; high-strength structural shapes $6.45; alloy structural shapes $5.45; carbon plates $4.275; high strength plates $6.50; HR alloy plates $5.85; bright basic wire $6.00; and HR wire rods $4.925, all per 100 lb. Nails and staples column 142; barbed wire column 164.

SHEETS AND STRIP . . . **Chicago:** Hot and cold-rolled sheets solid and well booked through second quarter; strip also stronger, with deliveries extended by 2-3 weeks in last 30 days; some sources talking of inventory problem during second half. **East:** Cold-rolled booked into second quarter; hot-rolled gaining strength accordingly. **Cleveland:** Some auto builders booking business for second quarter delivery; some March business making the rounds with no takers. **Pittsburgh:** First-quarter business is largely spoken for. **Detroit:** Shortage of sheets has strengthened cold-rolled strip demand through January and into February as well.

GALVANIZED SHEETS . . . Second quarter virtually filled in **Chicago** area where minimum delivery on continuous is 12 weeks, on hand-dipped five weeks. Market also continuing strong in the **East**, which reports backlog reaching into second quarter on continuous; hot-dip runs from 6 to 10 weeks on lighter gauges. New capacity and speeded up production lines planned for 1955 probably will ease this market during latter half of the year.

BARS . . . Carbon and alloy demand has picked up considerably in last several weeks. In **Detroit** one producer is booked through January and February amid indications that at least one car maker has finally worked off its bar inventory. Cold-finished and hot-rolled producers in **Chicago** counting on good January and February, possibly first quarter. In **Cleveland**, only spot tonnage is available before February on hot-rolled and cold-finished. Market continuing to improve in the **East** and **Pittsburgh**, trade sources report.

PLATES . . . Market is marking time until the railroads and pending pipeline projects materialize. There's a good chance that this will happen some time during first quarter. Producers could use the business and have been waiting a long time for the railroads to re-enter the market.

STRUCTURALS . . . No sign of a significant improvement in the near future. Even wide-flange beams are easing in the **Chicago** district, although in the **East** this item continues firm. Producers looking forward to construction pickup in first quarter and possible improvement in railroad business in that period.

TUBULAR PRODUCTS . . . Oil country goods market still suffering from inventory problem. Producers bracing themselves for last-minute rush orders in first quarter. Merchant pipe demand fair. Mechanical and pressure tubing sales are improving.

WIRE . . . Overall wire market is largely unchanged. Manufacturers wire good, merchant wire off seasonally. Farm demand expected to strengthen market probably some time in the first quarter.

WAREHOUSE . . . With usually-slow December-January business holding at relatively high level, **Chicago** distributors believe first quarter 1955 will exceed any quarter of 1954; it looks like 1955 business will run 5-10 pct ahead of this year. In **Cleveland** December business will equal or better that of November. On the **West Coast**, warehousemen predict business will get off to a running start as the new year begins.

Purchasing Agent's Checklist

STEEL: U. S. 1954 output slumped 20.8 pct below 1953 . . . . . p. 17

STEEL: Ohio producers find new markets nearby . . . . . p. 19

TITANIUM: Republic Steel develops new Mexican orebody . . . . . p. 20

BUSINESS: 1954 was country's second best year . . . . . p. 26

Comparison of Prices

(Effective Dec. 28, 1954)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

	Dec. 28 1954	Dec. 21 1954	Nov. 30 1954	Dec. 29 1953
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	4.05¢	4.05¢	4.05¢	3.925¢
Cold-rolled sheets	4.95	4.95	4.95	4.775
Galvanized sheets (10 ga.)	5.45	5.45	5.45	5.275
Hot-rolled strip	4.05	4.05	4.05	3.925
Cold-rolled strip	5.79	5.79	5.79	5.513
Plate	4.225	4.225	4.225	4.10
Plates wrought iron	9.30	9.30	9.30	9.30
Stainl'a C-2 strip (No. 302)	41.50	41.50	41.50	41.50
Tin and Ternplate: (per base box)				
Tinplate (1.50 lb.) cokes	$9.05	$9.05	$9.05	$8.95
Tinplate, electro (0.50 lb.)	7.75	7.75	7.75	7.65
Special coated mfg. ternes	7.85	7.85	7.85	7.75
Bars and Shapes: (per pound)				
Merchant bars	4.30¢	4.30¢	4.30¢	4.16¢
Cold-finished bars	5.40	5.40	5.40	5.20
Alloy bars	5.075	5.075	5.075	4.875
Structural shapes	4.25	4.25	4.25	4.10
Stainless bars (No. 302)	35.50	35.50	35.50	35.50
Wrought iron bars	10.40	10.40	10.40	10.40
Wire: (per pound)				
Bright wire	5.75¢	5.75¢	5.75¢	5.525¢
Rails: (per 100 lb.)				
Heavy rails	$4.45	$4.45	$4.45	$4.325
Light rails	5.35	5.35	5.35	5.20
Semifinished Steel: (per net ton)				
Rerolling billets	$64.00	$64.00	$64.00	$62.00
Slabs, rerolling	64.00	64.00	64.00	62.00
Forging billets	78.00	78.00	78.00	75.50
Alloy blooms, billets, slabs	86.00	86.00	86.00	82.00
Wire Rod and Skelp: (per pound)				
Wire rods	4.675¢	4.675¢	4.675¢	4.525¢
Skelp	3.90	3.90	3.90	3.75
Finished Steel Composite: (per pound)				
Base price	4.797¢	4.797¢	4.797¢	4.634¢

	Dec. 28 1954	Dec. 21 1954	Nov. 30 1954	Dec. 29 1953
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$61.19	$61.19	$61.19	$61.19
Foundry, Valley	56.50	56.50	56.50	56.50
Foundry, Southern, Cin'ti	60.43	60.43	60.43	60.43
Foundry, Birmingham	52.88	52.88	52.88	52.88
Foundry, Chicago	56.50	56.50	56.50	56.50
Basic del'd Philadelphia	60.27	60.27	60.27	60.27
Basic, Valley furnace	56.00	56.00	56.00	56.00
Malleable, Chicago	56.50	56.50	56.50	56.50
Malleable, Valley	56.50	56.50	56.50	56.50
Ferromanganese‡, cents per lb.	9.50¢	9.50¢	9.50¢	10.00¢
‡ 74-76 pct Mn base.				
Pig Iron Composite: (per gross ton)				
Pig iron	$56.59	$56.59	$56.59	$56.59
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$33.50	$33.50	$32.50	$31.50
No. 1 steel, Phila. area	31.50	31.50	32.00	29.50
No. 1 steel, Chicago	33.50	33.50	32.50	29.50
No. 1 bundles, Detroit	27.50	27.50	27.50	22.50
Low phos., Youngstown	35.50	35.50	34.50	33.50
No. 1 mach'y cast, Pittsburgh	42.50	42.50	42.50	43.50
No. 1 mach'y cast, Philadel'a	42.00	42.00	42.00	40.50
No. 1 mach'y cast, Chicago	44.00	44.00	41.50	36.50
Steel Scrap Composite: (per gross ton)				
No. 1 heavy melting scrap	$32.83	$32.83	$32.33	$30.17
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.38	$14.38	$14.38	$14.38
Foundry coke, prompt	16.75	16.75	16.75	16.75
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	30.00	30.00	30.00	29.75‡
Copper, Lake, Conn.	30.00	30.00	30.00	30.00
Tin, Straits, New York	87.25†	85.625*	89.875	84.50
Zinc, East St. Louis	11.50	11.50	11.50	10.00
Lead, St. Louis	14.80	14.80	14.80	13.30
Aluminum, virgin ingot	22.20	22.20	22.20	21.50
Nickel, electrolytic	67.67	67.67	67.67	63.08
Magnesium, ingot	27.75	27.75	27.75	27.00
Antimony, Laredo, Tex.	28.50	28.50	28.50	28.50

† Tentative. ‡ Average. * Revised.

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Steel Scrap Composite

Average of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

←To identify producers, see Key on P. 88→

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Bethlehem *B3*	58.00	58.50	59.00	59.50	.....
Birmingham *R3*	52.38	52.88	.....	.....	.....
Birmingham *W9*	52.38	52.88	.....	.....	.....
Birmingham *U4*	52.38	52.88	56.50	.....	.....
Buffalo *R3*	56.00	56.50	57.00	.....	.....
Buffalo *I11*	56.00	56.50	57.00	.....	.....
Buffalo *W6*	56.00	56.50	57.00	.....	.....
Chicago *I4*	56.00	56.50	56.50	57.00	.....
Cleveland *A5*	56.00	56.50	56.50	57.00	61.00
Cleveland *R3*	56.00	56.50	56.50	.....	.....
Daingerfield *L3*	52.50	52.50	52.50	.....	.....
Duluth *I4*	56.00	56.50	56.50	57.00	.....
Erie *I4*	56.00	56.50	56.50	57.00	.....
Everett *M6*	.....	61.00	61.50	.....	.....
Fontana *K1*	62.00	62.50	.....	.....	.....
Geneva, Utah *C7*	56.00	56.50	.....	.....	.....
Granite City *G2*	57.90	58.40	58.90	.....	.....
Hubbard *Y1*	.....	.....	56.50	.....	.....
Minnequa *C6*	58.00	59.00	59.00	.....	.....
Monessen *P6*	56.00	.....	.....	.....	.....
Neville Isl. *P4*	56.00	56.50	56.50	.....	.....
Pittsburgh *U1*	56.00	.....	.....	57.00	.....
Sharpsville *S3*	56.00	56.50	56.50	57.00	.....
So. Chicago *R3*	56.00	.....	56.50	.....	.....
Steelton *B3*	58.00	58.50	59.00	59.50	64.00
Swedeland *A2*	58.00	58.50	59.00	59.50	.....
Toledo *I4*	56.00	56.50	56.50	57.00	.....
Troy, N. Y. *R3*	58.00	58.50	59.00	59.50	64.00
Youngstown *Y1*	.....	.....	56.50	57.00	.....
N. Tonawanda *T1*	.....	56.50	57.00	.....	.....

DIFFERENTIALS: Add 50¢ per ton for each 0.25 pct silicon over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.50 pct manganese over 1 pct, $2 per ton for 0.5 to 0.75 pct nickel, $1 for each additional, 0.25 pct nickel. Subtract 38¢ per ton for phosphorus content 0.70 and over.

Silvery Iron: Buffalo, *H1*, $66.25; Jackson, *J1*, *G1*, $65.00. Add $1.00 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 17 pct. Add $1 per ton for 0.75 pct or more phosphorus. Add 75¢ for each 0.50 pct manganese over 1.0 pct. Bessemer ferrosilicon prices are $1 over comparable silvery iron.

STAINLESS STEEL

Base price cents per lb. f.o.b. mill.

Product	301	302	303	304	316	321	347 Cb	410	416	430
Ingots, rerolling	16.75	17.75	19.25	19.00	29.25	23.50	35.50	14.00	—	14.25
Slabs, billets, rerolling	21.00	23.25	25.25	24.50	37.50	30.25	46.75	18.25	—	18.50
Forg. discs, die blocks, rings	39.00	39.00	42.00	41.25	61.25	46.25	—	31.00	31.75	31.75
Billets, forging	30.00	30.25	32.75	31.75	47.75	36.00	54.75	24.00	24.50	24.50
Bars, wires, structurals	35.75	36.00	38.75	38.00	56.75	42.75	64.25	28.75	29.25	29.25
Plates	37.75	38.00	40.25	40.50	60.00	46.50	69.25	30.00	30.50	30.50
Sheets	41.75	42.00	49.25	44.50	64.00	51.25	77.50	34.25	41.25	34.75
Strip, hot-rolled	30.25	32.50	37.25	35.00	54.50	41.75	63.00	26.25	—	27.00
Strip, cold-rolled	38.75	42.00	46.00	44.50	64.00–64.25	51.25–51.50	77.50	34.25	41.25	34.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* McKeesport, Pa., *U1;* Washington, Pa., *W2, J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Ft. Wayne, *J4.*

Strip: Midland, Pa., *C11;* Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A3;* Bridgeville, Pa., *U2;* Detroit, *M2;* Canton-Massillon, O., *R3;* Middletown, O., *A7;* Harrison, N. J., *D3;* Youngstown, *C5;* Sharon, Pa., *S1;* Butler, Pa., *A7;* Wallingford, Conn., *U3* (.25¢ per lb higher) *W1* (.25¢ per lb higher); New Bedford, Mass., *R6.*

Bar: Baltimore, *A7;* Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R3;* Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Canton, O., *T5;* Ft. Wayne, *I4.*

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2.*

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11.*

Plates: Brackenridge, Pa., *A3;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland Massillon, *R3;* Coatesville, Pa., *C15.*

Forged discs, die blocks, rings: Pittsburgh, *C11;* Syracuse, *C11;* Ferndale, Mich., *A3;* Washington, Pa., *J2.*

Forgings billets: Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11*

Market Firm In Holiday Lull

Report increased strength from several centers . . . Tonnages are small as holiday schedules cut consumption . . . Composite remains unchanged at $32.83.

◆ A GENERAL strengthening throughout the market was reported last week. Due to reduced consumption of holiday melt schedules most consumers stayed out of the market.

As a result new sales were few and tonnages small. There was no change in THE IRON AGE Heavy Melting Steel Scrap Composite which remained at $32.83 per gross ton.

In Detroit, demand for No. 1 grades is good and with automobile lists closing late this week it is expected that prices on these grades may be upped $1 per ton.

Pittsburgh . . . Despite a holiday lull, the market appears to be gaining strength. Dealer resistance has forced brokers to offer higher prices for material to fill existing orders. Dealer inventories are said to be low and any new business probably will mean buying from out-of-district sources. Meanwhile, consumers are laying low as holiday melt schedules reduce consumption. One mill has held up shipments temporarily. Low phos, some railroad items, and several cast grades moved up. Cast iron borings were adjusted downward $1.

Chicago . . . With little actual advance in prices at press time, the Chicago market remained extremely strong, with offers to sell on No. 2 heavy melting reported at $33. No. 2 dealer bundles at $25, and reroller rail at $54. Broker buying continued to advance, scrap supplies in yard were generally reported low. Broker purchases at consumer delivered prices were again reported in steel making grades. With a major consumer expected to enter the market in the near future, at least part of this buying is believed to represent speculation based on the combination of uniformly high mill hot metal rates and low scrap supplies among suppliers. Railroad grades were more realistic than has been the case in months, as consumer buying prices held at improved levels.

Philadelphia . . . Despite fairly well depleted stockpiles, lowered holiday melt schedules enabled local mills to stay out of the steelmaking scrap market insofar as volume tonnage is concerned. General feeling is that prices will hold at present levels until significant raising of the operating rate occurs. One source feels that those buying for export markets will not go higher on No. 1 steel due to increased overseas shipping costs.

Cleveland . . . Market continued to hold a firm undertone although new sales continued on holiday doldrums. Tonnage scheduled for one mill was diverted to a Valley mill by one broker at slightly higher price but does not affect market. Industrial scrap tonnage offered for December is exceeding estimates by 25 pct in almost all instances. Detroit tonnage is going by rail to Canton area at about $36 since boats are tied up until April and Chicago and Buffalo would need a $36-37 market.

Buffalo . . . A steady scrap market continued to mark time during the holiday period here with hopes that a high level of ingot production would lead to higher prices in the near future. However mills are not rushing with bids. Increased usage of hot iron is a factor. Canadian buying continues to support cast market.

Detroit . . . Month-end quiet left prices unchanged despite a general strengthening of the market. Demand for No. 1 grades continues good and automobile lists, closing late this week, are expected to bring prices at least $1 over December. Tonnage is very high, but there does not appear to be any market saturation on No. 1 bundles. With abundance of primary grades, demand for No. 2 grades is now at a very low level.

St. Louis . . . The steady mark which has marked the 1954 scra situation here continues to the end o the year. The steel operating ra is up 11.5 points to 74.5 which is co trary to the usual holiday patter Prices are unchanged except for u stripped motor blocks for which sale was made to a district mill a an advance of $2.

Boston . . . A moderate increase i demand acted to move the price o No. 1 bundles up $1. Chemical bor ings suddenly becoming more activ as demand increased. As a resul price climbed $2. Exporters are find ing it difficult to line up ships to load

New York . . . Recent export busi ness acted to keep the market firm although little tonnage moved during the holiday lull. Most brokers expect a pickup in domestic buying after the first of the year.

Birmingham . . . The largest buyer of blast furnace scrap in the district bought additional No. 2 heavy melting and released shipments of No. 2 bundles this week. The market here has not yet felt the impact of automobile buying and prices have been steady except for an advance this week in No. 1 RR heavy melting. Scrap is coming into the yards in larger quantities and dealers are letting most of it go at current prices, retaining only a limited amount for inventory. There is a good demand for electric furnace grades but prices have not changed because of an influx of unprepared railroad scrap.

Cincinnati . . . Market taking on firmer tone with start-up of new furnaces. Some No. 2 steel and bundles going by water at $4 per ton freight to Pittsburgh, delivering there for about $29.30. Foundry prices firm but volume low.

West Coast . . . Los Angeles prices are still holding at higher levels. Export activity continues. Four-day wildcat strike at Kaiser Steel's Fontana plant was not long enough to have any effect on scrap picture. First of the month may see some price changes, again depending on volume of export business. All mills report their inventories are in better shape and they're no longer in a "scared" way. Activity is still light in the San Francisco and Seattle areas. No price changes expected.

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SCRAP
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EXPORTS - IMPORTS — LIVINGSTON & SOUTHARD, INC., 99 Park Avenue, New York, N. Y. *Cable Address:* FORENTRACO

Markets Stronger as '54 Ends

Metals generally stronger now than a year ago . . . Consumers again living from pipeline, trying to rebuild inventories . . . Government buying helped—By *R. L. Hatschek.*

◆ CHRISTMAS, as usual, kept the nonferrous markets quiet with supply, demand and outlook practically unchanged from the previous week. So let's have a look at the year just ending:

Inventories and their liquidation were a highlight of 1954 with industry living off the shelf as much as possible. Industry often seems to build its stocks during periods of high-demand—such as during the Korean War. But the pressure came off in '54—both military and civilian. Result was that inventories suddenly looked too big.

They were trimmed down considerably during the year, however, and metal men are pleased to note that many of their customers are now living off the pipeline and others are again trying to rebuild stocks.

ALUMINUM . . . New record level of production was the highlight in aluminum during 1954. The nation siphoned approximately 1,458,000 tons from its pots during the year to top the previous alltime high of 1,252,015 tons set in 1953. This was outstanding in view of the general decline in the economy from 1953's record-setting pace.

Markets for most aluminum mill products were down at the beginning of the year—decline actually starting in third quarter 1953. This gave a truer reflection of overall economic trends. But government contracts assured a sound market for pig and ingot in the stockpile.

Most of the major expansions started during the Korean War were operating by 1954. A few more potlines will come in during 1955. Water conditions for hydroelectricity were in good shape in the Pacific Northwest. Southeastern reduction plants didn't fare as well but not too much production was lost.

Foil continued to be aluminum's champion racking up healthy records practically every month. New applications and a bigger bite of the packaging market are at the root of the boom.

COPPER . . . A year ago there was a six-digit Chilean cloud over the copper market—definitely casting a weakening shadow. Outlook was for a definite reduction in prices. But it never came off.

The U. S. stockpile grabbed off the Chilean metal and demand held at a far higher level than many of the experts predicted. Result was that the price held steady. And the strikes early in second half, both in this country and elsewhere, cut production dangerously low. This reversed the price weakness and the market is now extremely strong, though at basically unchanged prices.

Stocks of refined copper held in the U. S. dipped to an alltime low in October as a result of curtailed production and revitalized demand. It was only by virtue of some 40,000 tons of copper released by the government in fourth quarter (not from stockpile) that shutdowns and cutbacks were averted.

As for consumption, brass and copper were off about 15 to 20 pct in 1954. The brass industry was in a very weak position early in the year. But a booming building market plus the Detroit surge after 1955 model introductions set things on a much firmer base later on.

MAGNESIUM . . . Compared with '53, magnesium is down at least 20 pct. But some bright spots do show through. Dow Chemical Co.'s new mill is one. And some good basic groundwork was laid to get magnesium into civilian markets instead of military. Outlook for '55 is definitely better.

As for the government's Velasco reduction plant, an announcement was expected this week stating that the lease to Dow has been renewed for a 3-year period. This will assure ample supplies to take care of current demand.

ZINC, LEAD . . . Gloomy outlook prevailed for zinc early this year with the mining industry clamoring for some sort of government aid. Specifically requested were either higher import tariffs or import restriction. Some wanted both. Others thought subsidies best. And the industry needed something for stocks were tremendous—and still edging upward despite production cutbacks.

Aid came in June. But it was in the form of "new look" stockpiling which siphoned off an estimated 15,000 tons monthly except during strike-caused production declines. Stocks were nearly cut in half by year end through a combination of the government buying and a resurgence of consumer demand late in the year.

Lead was also in bad shape early in the year and the aid came via revived stockpiling in June. Tonnage taken was on the order of 10,000 tons monthly, it is estimated.

But, while the lead price was never as low as zinc's, the comeback wasn't as strong.

TIN . . . Ebb and flow of getting the International Tin Agreement into effect was the main point of tin in 1954. It still hasn't been ratified by all nations concerned but the general effect throughout the year was to maintain reasonable stability and a slightly higher level of prices than at the beginning of the year.

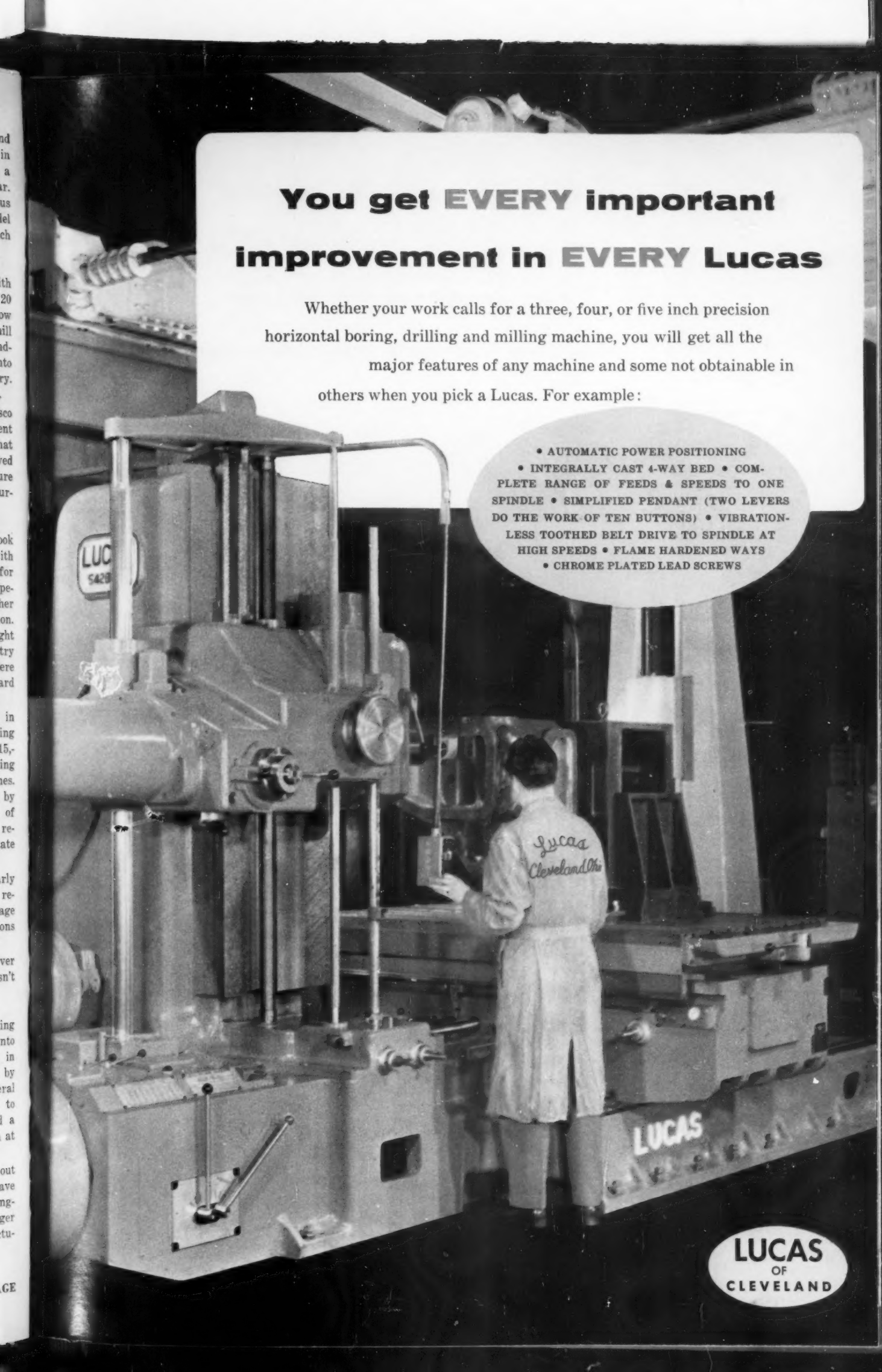
Reflecting the general concern about delays in ratification, prices have been off in recent weeks. But the long-range trend should prove stronger when the tin pact becomes an actuality.

Daily Nonferrous Metal Prices

(Cents per lb except as noted)

	Dec. 22	Dec. 23	Dec. 24	Dec. 25	Dec. 27	Dec. 28
Copper, electro, Conn.	30.00	30.00	30.00	....	30.00	30.00
Copper, Lake, delivered	30.00	30.00	30.00	....	30.00	30.00
Tin, Straits, New York	86.75	87.25	87.25	....	87.25	87.25
Zinc, East St. Louis	11.50	11.50	11.50	....	11.50	11.50
Lead, St. Louis	14.80	14.80	14.80	....	14.80	14.80

Note: Quotations are going prices **Tentative*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Whether your work calls for a three, four, or five inch precision horizontal boring, drilling and milling machine, you will get all the major features of any machine and some not obtainable in others when you pick a Lucas. For example:
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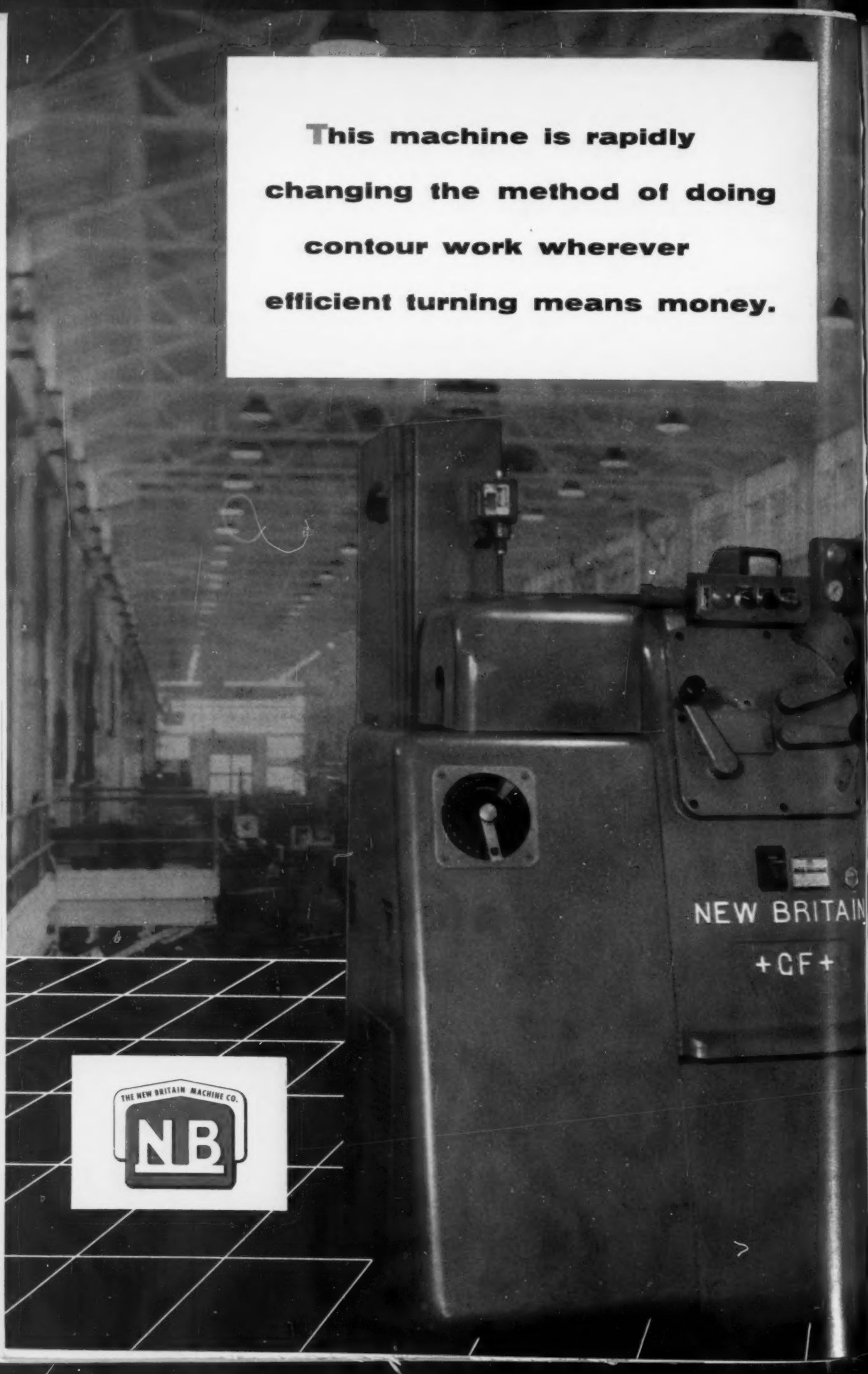
This machine is rapidly
changing the method of doing
contour work wherever
efficient turning means money.
NEW BRITAIN
+CF+
THE NEW BRITAIN MACHINE CO.
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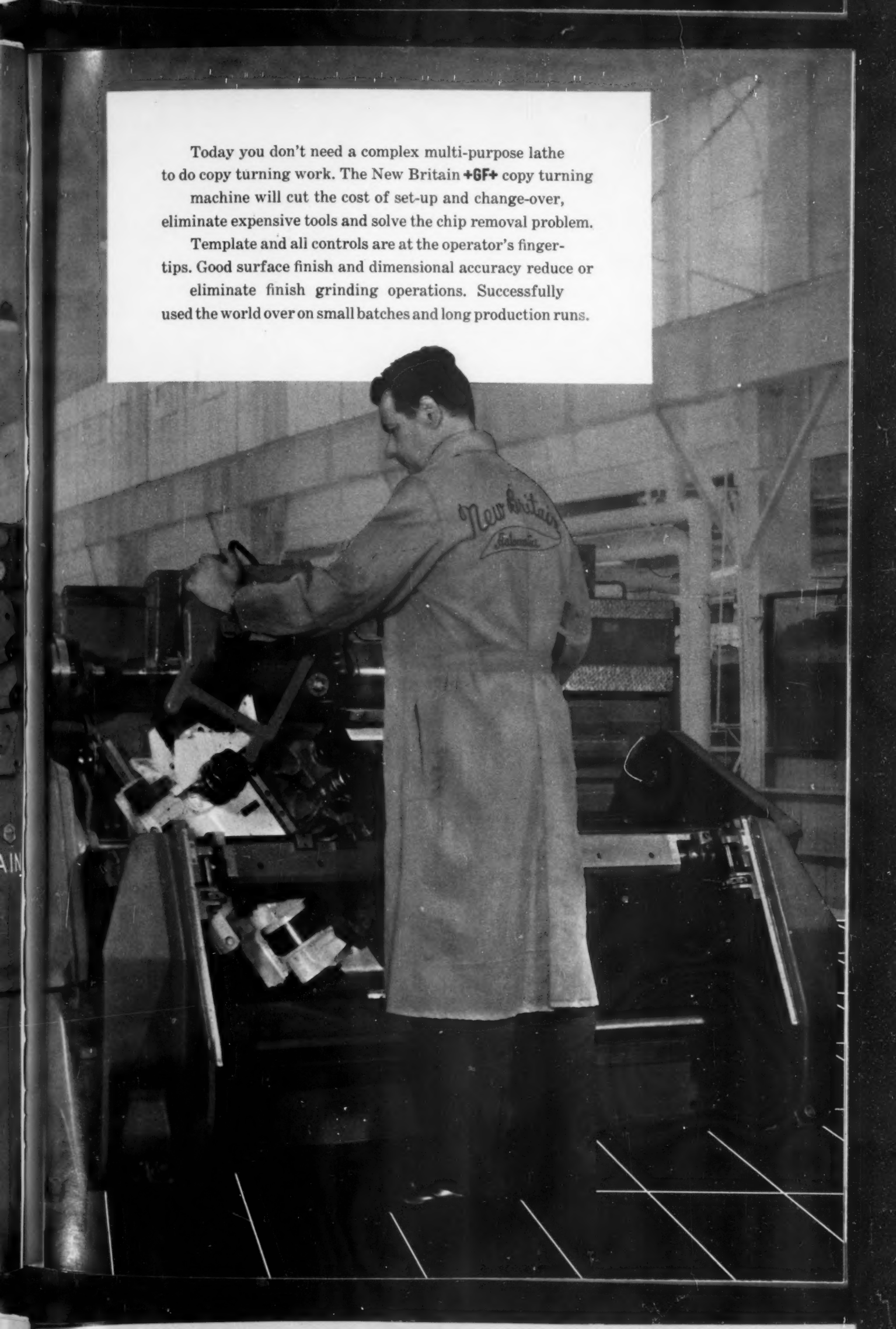
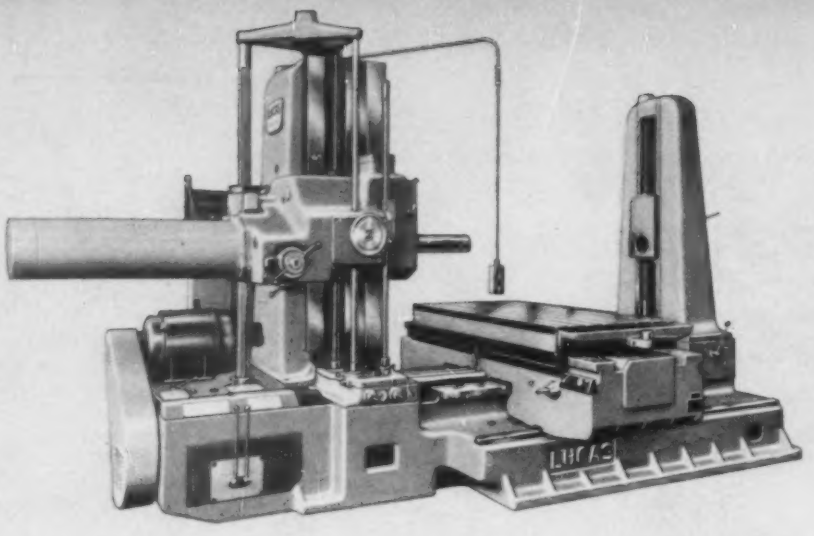


Today you don't need a complex multi-purpose lathe to do copy turning work. The New Britain +GF+ copy turning machine will cut the cost of set-up and change-over, eliminate expensive tools and solve the chip removal problem. Template and all controls are at the operator's finger-tips. Good surface finish and dimensional accuracy reduce or eliminate finish grinding operations. Successfully used the world over on small batches and long production runs.



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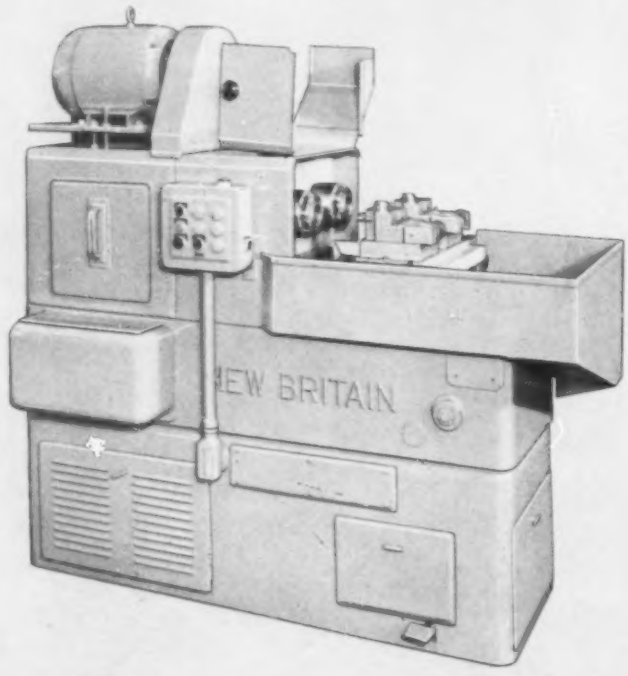
A Lucas Precision Horizontal Boring, Drilling & Milling Machine will perform many operations in sequence on one piece or a thousand, from small components to large weldments. It will not only make heavy roughing cuts but will also finish to the close tolerances required in precision manufacturing. Quickly set up for short runs. Incorporates Automatic Power Positioning for multiple operation work.

NEW BRITAIN +GF+

The New Britain **+GF+** copy turning machine is built on a new principle with copying saddle mounted below the spindle and on conventional lathe bed. Chips fall free and accumulate through the back of the machine. Power operated tail stock, centralized controls and front mounted prototype or template reduce operator fatigue. Powerful drive and a wide variety of speed and feed ranges make the New Britain **+GF+** a profitable producer on short or long runs.



NEW BRITAIN PRECISION BORING MACHINES

include vertical, horizontal and double end models — a complete line for both straight and contour work. New Britain's exclusive application of cam control gives your tool engineer a completely new approach to tooling, for complex pieces. Methods impossible on other types of machine can be employed to speed production, simplify tooling, eliminate finish operations and assure repetitive accuracy on a wide variety of work.

Our general catalog is filed in the Sweet's Machine Tool Catalog File.

AUTOMATIC BAR and CHUCKING MACHINES • PRECISION BORING MACHINES
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NEW BRITAIN +GF+ COPYING LATHES

The NEW BRITAIN MACHINE COMPANY

New Britain-Gridley Machine Division, New Britain, Connecticut
Lucas Machine Division, Cleveland 8, Ohio

The Iron Age

SALUTES

Joseph L. Bonanno **An extraordinary devotion to his profession, plus a commendable impatience with traditional methods and a desire to test his skill in new fields have done much to maintain his firm's leadership.**

Confronted with the problem of raw material shortages and rapidly rising production costs immediately after World War II, Joseph L. Bonanno, chief engineer of the Lionel Corp., Irvington, N. J., acted with typical, direct efficiency. He set up a metallurgy laboratory in the plant to investigate the possibilities of fabricating small, precision parts from available powdered metals.

Joe's strategy paid off handsomely. Lionel's sintered metal parts were produced at a fraction of the cost of previous rods, stampings and die castings. The powder metal techniques facilitated a fast switchover from defense production to Lionel's post-war toy electric trains.

After getting his ME degree from Stevens Institute of Technology, Joe did post-graduate work in electrical and communications engineering, came to Lionel in 1931 to establish an engineering department. The expansion of the company's line and world-wide respect for the Lionel name testify to his success in that assignment.

Much more than just a work-a-day chief engineer, Joe takes a truly professional attitude. A great deal of his spare time is devoted to keeping posted on all fields of engineering. To these ends are his participation in the activities of several engineering societies, among which he numbers presidency of the Newark section of Society of Plastics Engineers.

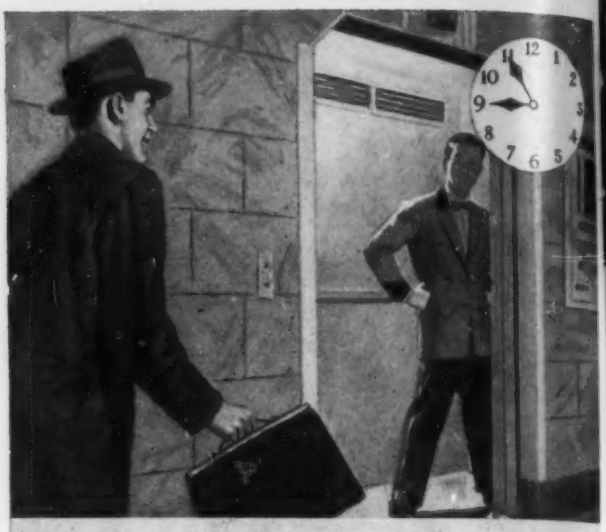
His contributions to Lionel's line of trains, spinning type fishing tackle and the newest product, a stereo color camera, the Linex, are many. Joe has over 60 patents on developments in mechanics, electronics and photography.

Joe lives with his wife and daughter in South Orange, N. J. Lawn culture and gardening occupy many of his leisure hours. A real treat is a night at the opera with the family or listening to his extensive collection of classical and symphonic records.

'round the clock with

CF&I-WICKWIRE WIRE

In this advertisement we continue to take you through a typical day in the life of John Q. Citizen...showing you the part CF&I-Wickwire Wire plays in his everyday activities.



OFFICE BUILDING—8:55A.M. John never stops to think about it but he rides up to work on dependable elevator cable. Without this indispensable wire product—much of it made of CF&I-Wickwire Wire—modern multi-story buildings would be unable to function.

OFFICE—9:00 A.M. Here we are, inside John's office. Where is the wire? All around us. Paper clips inside the desks. Springs inside the telephones and the typewriters—even under John's swivel chair. Staples, coat hangers, ring binders—these and countless other office necessities are made from wire—very often of CF&I-Wickwire Wire.

FACTORY—3:00 P.M. Let's accompany John on a trip to his firm's nearby factory. The premises are inclosed by a wire fence. Inside, we find wire mesh cloth used as machinery guards. Metal processing belts made of woven wire. Springs of every variety to keep the machines going. All of these products use CF&I-Wickwire Wire.

Watch for the balance of John's day in our next advertisement which takes John back to his home and the relaxation of his living room.

For the Wire You Require — Check CF&I-Wickwire

CF&I-WICKWIRE WIRE

THE COLORADO FUEL AND IRON CORPORATION

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New facts for your file on

USS STAINLESS STEEL

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Stainless Steel milk dispensers fabricated at rate of 120 units per day

BY UNITED REFRIGERATOR

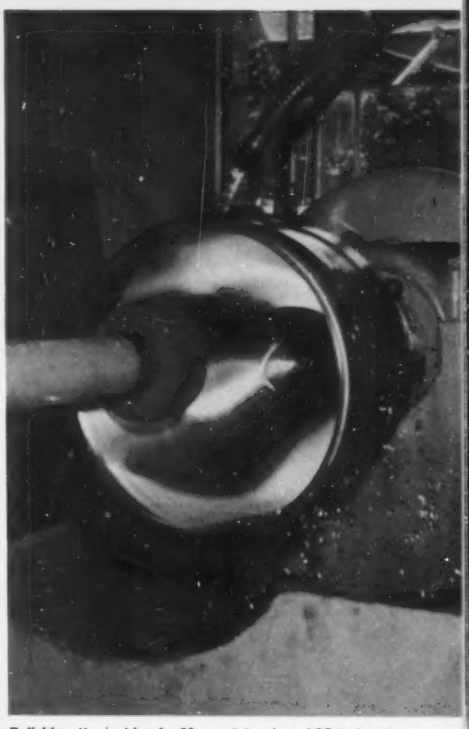
The experience of United Refrigerator Company, Hudson, Wis., shows how adaptable Stainless Steel is to mass production operations. Milk dispensers—used for serving cold milk in glasses in schools, restaurants and the armed services—are being fabricated from Stainless Steel at a rate of more than 120 units per day.

United uses no special equipment in fabricating Stainless Steel. Such operations as shearing, punching, notching, braking, soldering, spot welding and grinding take place on equipment used for fabricating mild steel.

Shop practices are much the same, too. Blades are kept a little sharper, dies a little smoother and greater care is exercised to prevent marring the smooth surface of Stainless.

The result is a product with a high degree of sales appeal . . . made from a material perfectly suited for the sanitary nature of the application.

Stainless Steel milk dispensers after assembly at United Refrigerator Company.



Polishing the inside of a 30-quart bowl at ACF Industries.

Mixing bowls –12 to 160 quarts– drawn from Stainless Steel

ACF INDUSTRIES, at its Milton, Pa. works, fabricates a line of industrial mixing bowls used by bakeries, restaurants, chemical plants, cosmetic manufacturers and the like. Depending on service conditions, the bowls are of carbon steel or Stainless Steel. But the same fabricating equipment is used for both.

Fabrication of a 30-quart Stainless bowl begins with two draws on a 1000-ton hydraulic press. The 31½″ circle is first reduced to 20″ and then to 14½″ making a bowl 15″ high. Stainless used is 16 gage.

The bowl is then annealed and pickled, the flange is trimmed, it is spun and beaded on a lathe, the outside is polished, handles and fittings are welded on and the inside is polished.

Even dies are used interchangeably between carbon and Stainless. Stainless requires only a little more careful handling.

Stainless Steel is not difficult to fabricate -it's just different

You pay no penalty in shop procedure to obtain the outstanding sales benefits of Stainless Steel. You can usually use the same equipment used for carbon steel with the addition of a little more power and a little more care.

So put Stainless Steel into your designs and into your selling. Our representatives will be glad to help you select the proper grade and fit it to your fabricating procedure.

USS

UNITED STATES STEEL CORPORATION, PITTSBURGH · COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
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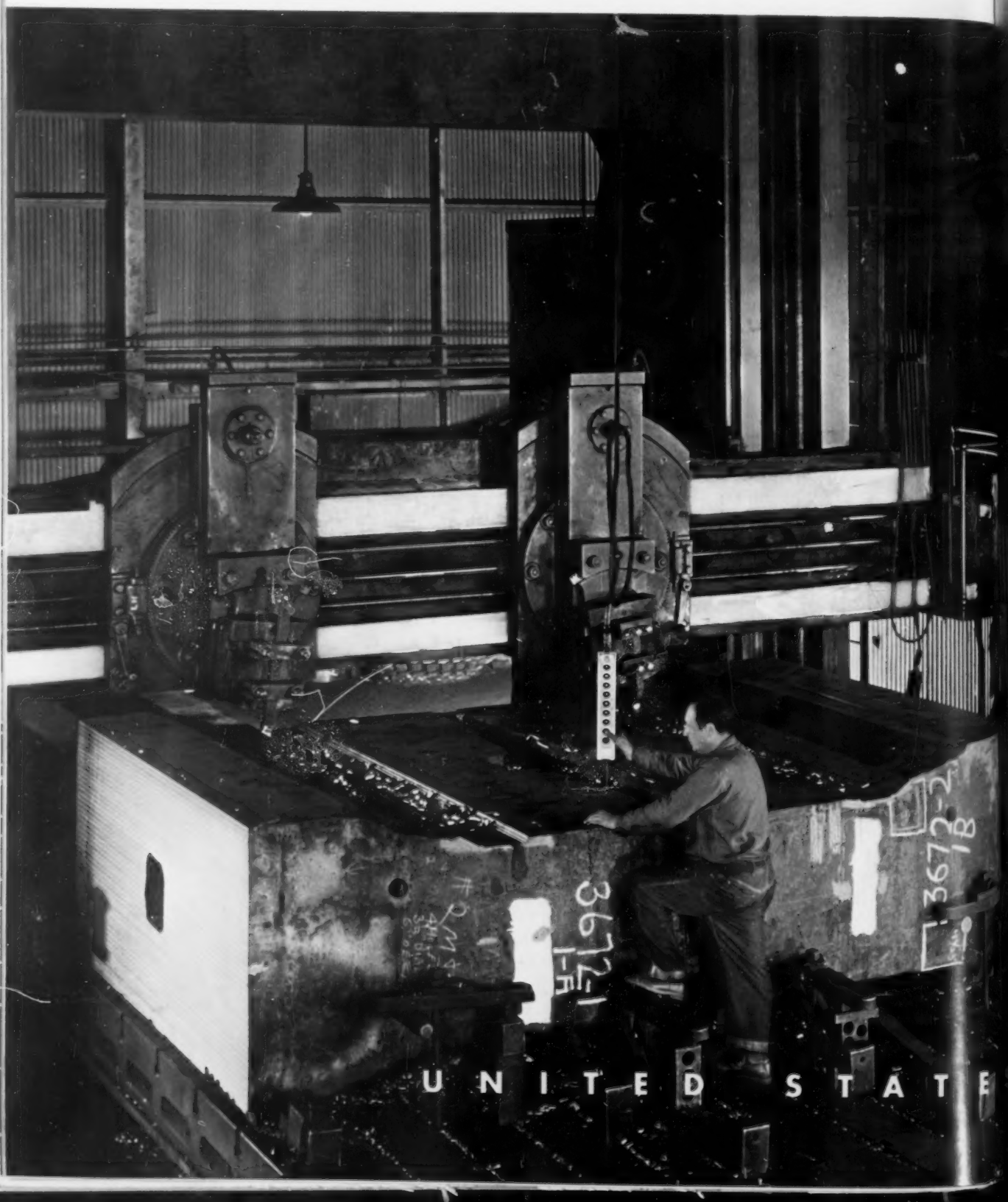
UNITED STATES STEEL

"We machine these forgings on the double"



says Frank W. Koch, U.S. Steel Machinist

IN a constant effort to save money and speed delivery for our customers, we commonly machine even large forgings two at a time. In the set-up shown here, 8 tools were used at one time (in four tool holders) to machine these forged hammer bases as fast as humanly possible without sacrificing quality in any way.

It takes an experienced machinist to do work like this. Frank Koch started as a USS Machinist's Helper in 1925, and he has been at the job ever since. He has been working the big planers, like the one in the picture, for 18 years. Some of the toughest machining problems in the book are old stuff to him. The young man on the right is Stanley Kiragis, a Machinist's Helper, following in Frank Koch's footsteps.

When you buy a USS Quality Forging, you can be sure that seasoned hands like Frank Koch will carefully nurse it through the shop. With "homemade" steel, and the finest equipment, they assure you of a quality job, delivered on time, every time. Write for our free 32-page booklet that describes these forgings. Address United States Steel, Room 4570, 525 William Penn Place, Pittsburgh 30, Pa.

USS Quality FORGINGS

heavy machinery parts—carbon, alloy, stainless

electrical and water wheel shafts

hammer bases and columns

forged steel rolls and back-up roll sleeves

FILE THIS UNDER ECONOMY!

ECONOMY

. . . the number one problem for most manufacturers is no longer a headache when you come to Torrington for your small precision metal parts.

Our plants produce parts like these—faster, better, and *for less* than you can make them yourself or buy them elsewhere . . . in the temper, hardness, and fine micro-finishes you desire. Almost 90 years of precision metal-working know-how assure you quality as well as economy.

Send for our Condensed Catalog today. It describes more fully the variety of parts we can produce. And let us quote on your precision parts. A sample part, a blueprint, or a letter outlining your needs will get a prompt reply—a quotation that can save you money.

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Specialties Division
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Makers of Torrington Needle Bearings

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EVERY MANUFACTURER who tries Roebling high carbon flat spring steel discovers the same thing... that this spring steel is absolutely unexcelled for dimensional and mechanical uniformity... for speeding production and cutting down rejects.

You always *pay* for the best when you buy flat spring steel... make sure you *get* it by specifying Roebling. John A. Roebling's Sons Corporation, Trenton 2, N. J.

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It's easy to

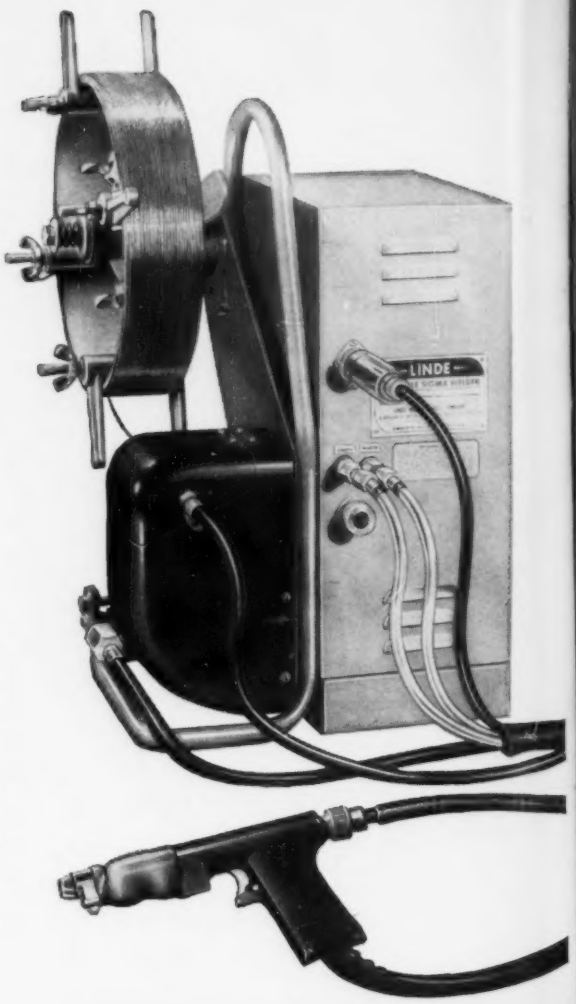
CUT WELDING COSTS

when you use a High-Speed

LINDE SWM-2

Trade-Mark

Portable Sigma Welder



Your welding department can easily make high-speed, low-cost fusion welds in aluminum, stainless steel, high temperature alloys, copper, carbon steel, and other metals with the LINDE SWM-2 Portable Sigma Welder. The LINDE SWM-2 is a complete control unit for manual sigma (Shielded Inert Gas Metal Arc) welding operations. It mechanically feeds welding wire from a coil into the weld area at a steady precontrolled rate and supplies a regulated quantity of argon to shield the weld from contamination by the atmosphere. No flux is used. In most cases the smooth, clean sigma welds need no post-welding treatment.

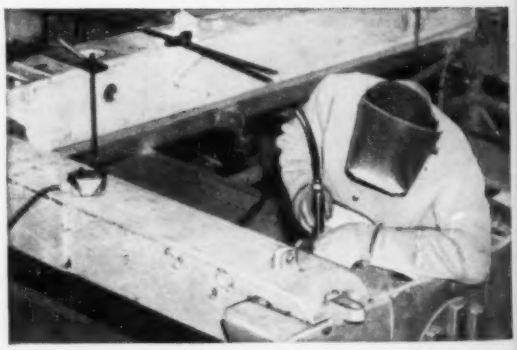
SIMPLIFIED AUTOMATIC OPERATION

The operator merely presses the trigger of the pistol type torch to energize the control circuit and start the flow of water coolant and argon gas. When an arc is struck by touching the consumable electrode to the workpiece, the wire feed automatically begins.

NEW CONSTANT POTENTIAL POWER SUPPLIES CAN BE USED

Either ordinary or constant potential DC power supplies can be used with a LINDE SWM-2. In constant potential welding arc voltages are preselected and held with outstanding consistency which permits positive starts and high-speed welds on thin metals.

Call your nearest LINDE office today for more information on how you can cut production welding costs with the LINDE SWM-2 Sigma (Shielded Inert Gas Metal Arc) Welder. Or write for your free LINDE SWM-2 catalog.



Production jumped 300% when the Heller Engineering and Manufacturing Company, Lynwood, California changed to sigma welding to fabricate aluminum engine shipping stands. Because the sigma welds were clean and sound, post-welding treatment was practically eliminated.

Linde Air Products Company

A Division of Union Carbide and Carbon Corporation

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Offices in Other Principal Cities
In Canada: DOMINION OXYGEN COMPANY
Division of Union Carbide Canada Limited, Toronto

The term "Linde" is a registered trade-mark of Union Carbide and Carbon Corporation.

Linde
Trade-Mark

At Janks Sandblasting Co., The Pangborn Blastmaster® Barrel

Cuts Cleaning Time from 1¼ Hours to 3 Minutes!

The Janks Sandblasting Company, Syracuse, N. Y., is a commercial blast cleaning firm handling ferrous and non-ferrous work. Recently the installation of a Pangborn Blastmaster Barrel, in a special below floor-level pit, has enabled Owner Bob Janks to lower his operating costs and charge his customers much less. How so? Certain typical items used to require an hour and 15 minutes to clean. Today the Blastmaster cleans them in *3 minutes* and gives a fine finish! No wonder Mr. Janks calls the Blastmaster "an excellent machine"!

Do *you* want a *better* finish . . . in *less* time . . . at *lower* cost? Then investigate the Pangborn Blastmaster Barrel, available in 1½, 3, 6, 12, 18 and 27 cu. ft. capacities. The letter that takes a minute to write may save you hundreds of dollars a year! Write for Bulletin 223A: PANGBORN CORPORATION, 500 Pangborn Boulevard, Hagerstown, Md.

Pangborn

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control Equipment.

BLAST CLEANS CHEAPER
with the right equipment for every job

*U. S. Patent # 2154908 (other patents pending)

Janks uses Malleabrasive* in Blastmaster for even faster operation.

This hole means savings —instead of shavings

THE hole in the tube above should have been packed full of money. It would have been a quick way to show you some of the money you'll save when you switch to Timken® seamless steel tubing for your hollow parts jobs.

Because the hole's already there, you eliminate practically all of the scrap you have to drill out when you use bar stock—the steel you pay for but don't use.

Because the hole's already there, you can start with finish boring. You can make your hollow parts faster, with less equipment and fewer production steps.

Because the hole's already there, screw machine stations and men are available for other operations. You add machine capacity without adding machines. You use your employees more efficiently.

To make sure you get every penny's worth of steel for your dollar, our engineers will be glad to study your operation and recommend the most economical tube size for your hollow parts job—guaranteed to clean up to finish dimensions.

Timken seamless steel tubing gives you a better quality product, too. The piercing operation by which it's made is basically a forging operation. This gives the tubing a uniform spiral grain flow and a refined grain structure that brings out the best in the quality of the metal. And this quality is uniform from tube to tube and heat to heat because of the Timken Company's rigid quality control. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

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